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The Cañons of the Snake and Columbia.

A Lecture Delivered Before the Geographical Society, New York, 1870.
By R. W. RAYMOND.

DURING the last two years, it has been my lot to travel upwards of twenty thousand miles in various directions across the States and Territories of the inland basin and Pacific slope of this continent. The object of these journeys was primarily connected with the gold and silver mines upon our public domain; and such observations as I was able to make of a general scientific character were necessarily incidental, rapid and superficial. They are not offered as contributions to exact and detailed knowledge, but rather as suggestions, the value and interest of which will doubtless vanish in the light of more careful investigations, but which may, for the present, be useful in awakening attention, and furnishing a broad, general outline of certain great natural features not yet universally familiar to the public.

Indeed, while the defects of hurried observations during rapid and extensive journeys are sufficiently obvious, they may be said to possess, nevertheless, a certain advantage in facilitating the formation of comprehensive views on the large scale. The close and minute study which is necessarily bestowed upon details, by the votaries of every natural science, is not always favorable to generalizations and wide comparisons. The slow accumulation of facts, which forms the essential foundation of science, is not itself science. Its tendency is towards the exaggeration of differences, rather than the recognition of similarities. Under the magnifying lens of the close observer, the smallest phenomena become important; and while one eye is at the microscope, we cannot see things in their true proportions with the other. A clerical friend once remarked that, in addition to his ordinary readings of the Bible by chapters or texts, he was accustomed occasionally to peruse a whole book at a sitting, in order to gain, what he was too likely to lose in minuter study, the sense of general scope and spirit. In like manner, I venture to think, it is well for us to turn now and then from the texts of Nature, and read with freer glance and wider range, her gospels and epistles—to leave for a while her sentences, fine-graven on stone or leaf, and skim her ponderous volumes, bound in continents, and margined by the sea.

The illustration may be applied in another aspect. As the Bible consists of many books, of different ages and human authorships, yet all constituting the one Revelation, so each of the natural sciences comes to its full revelation by successive contributions. This is especially true of physical geography and geology, two sciences which have not yet reached the stage of general formulæ—two Bibles, of which all the books have not been written. Each country seems to have a new aspect of the truth to present, enlarging and modifying the whole. Thus we have had a geology, founded upon the carefully studied phenomena of a small section of Europe. A new era in the history of that science was opened by the work of the British survey, and the rise of the British school of geologists. In this country we have had an American geology based on the microcosm presented by the States of New York and Pennsylvania. In all these different geologies, the presence and activity of the same dynamic agents is recognized; but the relative importance assigned to each naturally varies. And the scientific world now looks to the unexplored regions of America, Asia and Africa to furnish the necessary corrective equations, before the final formula can be evolved.

It seems to me that the regions west of the Rocky Mountains have something important to tell us in dynamic geology. A general survey leads to the impression that their most prominent features illustrate two points. They present to us vast areas in which we can study, perhaps better than any where else on the globe, the effects of aqueous and solfataric metamorphosis of rocks; and they offer in equal extent the proofs and illustrations of direct eruptive agencies. The State of Nevada is a type of the former class, and the immense basaltic overflows of California, Oregon, Washington and Idaho represent the latter.

The route travelled by me in 1869, from Sacramento overland to Portland, Oregon, thence up the Columbia to the Dalles, thence (after a brief excursion northward into Washington Territory) southwest, across the valley of the Des Chutes, up the valley of the John Day, through the mountains to Powder and Burnt rivers, and the Snake river, up the valley of the Snake, thence to Boise City, and finally, from Boise southward to Salt Lake, afforded views of many of the striking characteristics of this basaltic formation; and it will be my attempt to notice some of these in arbitrary order, rather than to present a complete and logically connected account of so large a subject.

All the streams I have named are part of the system of the Columbia. A word or two concerning the relation of this system, or rather of the Snake river half of it, to the structure of our inland basin. As Professor NEWBERRY, in a recent lecture before a sister society, has interestingly shown, the physical history of the country west of the Rocky Mountains may be divided into several stages. At first the waves of ocean washed the feet of the Rocky Mountains. Then, by the uprising of mountain ranges between, the salt tides of the interior were shut off from the parent sea, to which they could return only by way of the great rivers which ran northward and southward, around the ends of the new barrier. Continual rainfall and drainage soon freshened these inland waters, and the continent, at this period, presented the spectacle of the largest expanse of fresh water lakes ever existing, so far as we can discover, in the history of the globe. This state of things obtained on both sides of the Rocky Mountains, though I will not here discuss the question, whether the fresh-water deposits on both sides are absolutely contemporaneous. Certainly those of the East were not inferior in extent; and the great lakes which still remain, drained by the St. Lawrence, though quite insignificant, compared with the system of which they are a relic, may serve to give a hint of its grand proportions.

The fresh-water sea west of the mountains was subjected to yet other changes which did not take place in the east. A further rise of the mountain barriers cut off in many places the river drainage, leaving isolated lakes, with insufficient outlets, or none at all; and these, by virtue of the constant influx of waters, impregnated with saline matter, and the constant concentration caused by evaporation, soon became salt. Thus, what were the briny deeps, after masquerading for a while as fresh waters, reasserted their hereditary character, and appeared as briny shallows. Meanwhile, the rivers themselves put an end to the greater part of the lakes, by carving deeper and deeper channels, or by breaking suddenly through rocky dams, and thus draining to the bottom the inland reservoirs. This process was carried out by the Missouri and Arkansas in the east, the Rio Grande in the south, the Colorado in the southwest, and the Columbia and its tributaries in the northwest. The valleys of all these rivers indicate clearly the progress of erosion, gradually deepening the channel. It is most strikingly illustrated in the cañons of the Colorado and the Snake, while the passage of the Cascades, through which the Columbia rushes, "short-lived and jubilant" to the sea, is probably an instance of the sudden overcoming of a barrier, letting out, in an instantaneous flood, the mass of waters behind.

The present appearance of the inland basin is that of an elevated table land, corrugated with mountain ranges, and divided into meridional valleys, each with its own isolated water system. The disappearance of the vast bodies of water that once covered its surface, has greatly altered the climate, diminishing the rainfall, and transforming the greater part of the region into a desert. What rain it now receives must come from the Pacific, and the supplies from this quarter are intercepted, first by the coast ranges and then by the Sierra, so that the "leavings," distributed over the vast table land, are quite insignificant. Over the whole surface ranges, in perpetual winds, a dry and thirsty air, licking up with amazing rapidity all exposed moisture. The streams that rise in the mountain ranges, and flow downward into the valleys, soon disappear—partly absorbed in the sandy soil and partly (indeed, chiefly,) taken up by the atmosphere. Even large rivers, like the Humboldt, spread out into shallow lakes, erroneously called "sinks," and, exposing thus a large area to evaporation, dry up. Reese river flows northward for a hundred and fifty to two hundred miles, through a narrow valley, where it is frequently replenished by smaller tributaries; and, after this long journey, having almost reached the Humboldt, it pauses and is lost, dying, like a weary pilgrim, in sight of the shrine. In the immediate neighborhood the Carson river also has its sink.

The amount of water in these isolated streams and basins depends upon the fluctuating balance between rainfall (or snow thaw) and evaporation. This is curiously shown in the little system of the Truckee. This stream—a turbulent river—is the outlet of Lake Bigler, a beautiful mountain lake, situated among the summits of the Sierra, and fed by their melting snows. The Truckee flows north for a dozen miles along the range, then pitches downward and eastward, through the pass traversed now by the Central Pacific railroad, into the Nevada basin. Here it turns again at right angles to the north, and, flowing a score of miles, empties into Pyramid lake, which constitutes its sink. Bigler is fresh, Pyramid is salt; Bigler has no inlet, Pyramid no outlet; and from Bigler to Pyramid flows ever the swift Truckee. The snows of the Sierra thus find their way into the lower basin, to be thence taken up to fall again as snows—I had almost said—upon their native peaks; but the "circuit of Nature" is not in this case so prettily completed; since the evaporations of Pyramid lake are doubtless carried by prevailing winds to the east, to be precipitated, perhaps, on the rim of the basin of Salt Lake. It is evident that the change of level in one of these isolated lakes affords us a measurement with regard to the relative rainfall and evaporation—provided, the absence of drainage be ascertained. The Salt Lake is hundreds of feet lower than it once was; the former lacustrine beach can be distinctly traced, like a high-water mark, along the mountain sides. But this great change of level is doubtless due to sudden drainage, rather than slow subsidence of the water. Since the Mormons settled the country, the lake is said to be rising, and to have submerged already much land that was formerly dry, the year round. This may, however, be but a temporary fluctuation.

The Salt Lake basin is separated by so narrow a divide from the system of the Snake river, as to render it quite probable that this stream once drained it—that is to say, that the basin formerly spilled over its rim into the Snake river. This part of the country, or rather a region a little north and east, includes a curious nodal point, as it were, from which the headwaters of the Snake and the Colorado and the Missouri take their rise, and flow in different directions to the sea. It was near here, in the Wind River mountains, that FREMONT planted the stars and stripes upon what was supposed to be the highest point of the continent. LEWIS and CLARKE, who, in the time of President JEFFERSON, ascended the fork of the Missouri, which still bears his name, bestowed by them, found two springs, but a short distance apart, which contributed their waters, the one to the Pacific and the other to the Atlantic. The former may be considered as the source of the Lewis river, now more commonly called the Snake. From this point it pursues a devious course, to the southwest, then north, for perhaps nine hundred miles, until, having been strengthened on the way by its tributaries, the Owyhee, Boise, Sweetwater, etc., it joins with the northern fork of the Columbia, to make one of the stateliest rivers of the world.

TO BE CONTINUED.

Coal Mines on Fire.

THERE are many instances of vast masses of coal which have ignited and have been burning for years. When once well ignited, and all communication with the external air is not entirely cut off, (and some imperceptible fissures are quite sufficient to prevent this,) then the devouring element pursues its course without interruption. It partially burns the coal and calcines the sandstones and adjacent schists, changing their colors to a sort of red, and altering their composition. At Brule, near Saint-Etienne, there is a coal mine which has been on fire from time immemorial. The soil at the surface is baked and barren; hot vapors escape from it; sulphur, alum, sal-ammoniac, and various natural products are deposited on it; it might be supposed to be a portion of the accursed cities formerly consumed by the fires of heaven and earth.

Other burning coal mines are cited in France; for example, those of Decazeville, in Aveyron, and of Commentry, in the department of Allier. The inhabitants have even for a long time kept up those fires for the sake of working the aluminous salts which are given off from the coal and are deposited on the surface of the soil as a whitish efflorescence.

In the carboniferous basins of the Saarbruck and Silesia, there are likewise coal mines which have been on fire for a long time. In Belgium, between Namur and Charleroi, at a place called Falizolle, the fire has been alight for many years. The inhabitants formerly were in the habit of working the coal on their own account. Now it frequently happened that two parties came in contact, causing endless disputes and sometimes sanguinary fights. A favorite way of keeping rivals or competitors at a distance was to throw pieces of old leather on a burning brazier, causing an intolerable stench. One day the fire extended also to the coal, since which time it has never ceased burning. The fire, which burns underground, is seen through fissures in the rocks. Sulphur deposits itself round these vents, and acid gases are evolved.

In England, especially in Staffordshire, the ignition of the coal has produced surprising effects of alteration in the measures containing coal. The sandstones have become vitrified, baked and dilated by the fire, the banks of plastic clay hardened and changed into porcelain.

In the environs of Dudley there was formerly a coal mine on fire. The snow melted in the gardens as soon as it touched the ground. They gathered three crops a year; even tropical plants were cultivated; and, as in the Isle of Calyso, an eternal spring prevailed. In another Staffordshire colliery, the firing of which dates many years back, and which is called by the inhabitants "Burning Hill," it was noticed, as at Dudley, that the snow melted on reaching the ground, and that the grass in the meadows was always green. The people of the country conceived the idea of establishing a school of horticul-

ture on the spot. They imported colonial plants at a heavy expense, and cultivated them in this kind of open-air conservatory. One day the fire went out, the soil gradually resumed its usual temperature, the tropical plants died, and the school of horticulture was under the necessity of transferring their gardens elsewhere.—*Underground Life.*

Some Notes on the Holstein, Virginia, Salt and Gypsum.

By WYNDHAM ROBERTSON.

THE great salt deposit which lies in the valley of the North Fork of Holstein river at the south foot of Clinch mountain, the chief of the ridges of the great Apalachian range—as it bends southwestward till it loses itself in the basin of the Mississippi—was not of difficult discovery. Not less from its geological position—distant in all directions from any considerable known saline formation—than from the vast quantity of fossil remains found dispersed everywhere in the soil round about, it is plain that from immemorial time it has been the resort of all the larger quadrupeds, which at any period have inhabited this portion of our earth. Remains of the mastodon, elephant, elk, and others, but mainly the larger animals, the less compactness, probably of the smaller, leading to their speedier dissolution, are almost profusely found in its immediate vicinity. The railroad cut, through a swell of the valley rising westward from the salt wells, revealing a large bed of them, while in the ditches, cut in all directions for the drainage of the lake-like flat below, they were frequently encountered, and thrown out by the spade. Of these remains, a pair of very perfect tusks of the double curve which marked them as pertaining to the mastodon, upwards of eleven feet in length, but which, crumbling on exposure to the air, could be preserved but in small parts, and lesser ones of, perhaps as many inches, of that animal, (sent to the Smithsonian Institule) may not be unworthy of being specified. Even before their own instincts and necessities would have led to the discovery, no doubt the aboriginal settlers here, as everywhere, and always, hunters of wild beasts, were led on the track of their percursors, to an object of so prime a value to them. The "lick" of the animals *fera natura*, became the salt springs, doubtless, of the men, hardly less wild who followed after them—when, and how long before the era of the dimly seen, and now almost extinct, Massawomees, none can ever know—and are now brimming "salines" of their more civilized, and better instructed, successors, the British conglomerate races who settled Virginia.

I cannot learn, exactly, when the salt of the Holstein first became an article of trade, though it was an article of trade nearly a century ago. From small beginnings, the product of it continually, but gradually, increasing through that long interval has come now to reach near 450,000 bushels per annum. It has been distributed in all directions from its source, to distances determined only by the relative cost and difficulties of procuring it, as compared with those presented to the obtaining salt from other sources. The latter is mainly, the Liverpool salt on the east, and that of the Kanawha valley on the west. These constitute the natural permanent competitors, in times of peace, of the Holstein salt, and, though the disputed territory between them sways in or out, according to the varying circumstances of the price at which the market can be supplied at any time, by either; yet are they definite enough to form the basis of a regular and somewhat uniform business. The value of the salines to Southwestern Virginia and East Tennessee, is at all times very great; but how greatly they concern the vital interest of both these States, in particular, as well as those of the Carolinas and Georgia, and how deserving they are of the favor and fostering care of them all, can only justly be estimated by adverting to the part they have played in times of war. In the war of 1812, interrupting as it did the supply of foreign salt, wagons were sent to them from these works as almost the sole resources of the whole Confederacy lying between the Mississippi and the Potomac. At one period of the civil war, the product of them was nearly 10,000 bushels a day, or between 3 and 4,000,000 a year; and it deserves mention that this great draft upon the wells was met by them without apparent strain, or material deterioration in the quality of the brine. Still, the present nominal supply may be stated at but from 400,000 to 500,000 bushels. The causes of this limited amount are to be found mainly, in the costliness of wood; being still the cheapest fuel they can obtain; and of wagon and railroad transportation, the only transportation now available to these salines. The former is hauled in wagons over bad roads for considerable distances, the country convenient to the works being almost denuded of timber—or, over the railroad, at proverbial high railway wood freights; in both which costly modes, also, their salt alone can be sent to market, while the rival commodities, both foreign and domestic, are made and marketed far more cheaply, having coal to make them, and water to carry them, at their very doors. The success of either of two improvements to which public attention is now strongly drawn, by the far seeing and patriotic zeal and sagacity of Commodore MAURY, that of the Holstein river for steamboats to the saltworks, or of a railroad via Pound Gap, in Kentucky, the former furnishing cheaper wood and cheaper transportation, and the latter coal, at a distance of but 30 or 40 miles, and a new market, would enable the Holstein salt to supply a greatly extended area of county—quite probably, meeting the Liverpool as far as east as Richmond, Petersburg, and Danville. Already felt beneficial in the employment it extends to a large amount and a great variety of labor, (benefits which I think, if concentrated, would furnish support to at least 1,000 persons, without being supplemented by other resources,) it would then vastly augment those benefits, and become sensibly felt as an important addition to the wealth and resources of the State. In point of purity, the brine of these wells not only exceeds that of the wells of Cheshire, (the "Liverpool,") Onondaga, (the "Syracuse") and Kanawha, but of any known; while the salt manufactured from it exceeds in purity in like manner, all other salt with which we are acquainted, (including Turk's Island) made from brines, whether derived from wells, ponds, or sea water, except an infinitesimal difference in favor of the salt made from the latter at some point in Texas—at Curacoa and St. Kitts. I cite the proofs from the valuable report of Professor COOK, contained in the Annual Report of the Superintendent of the Onondaga works made to the New York Legislature in 1854; when more specimens than one had been analyzed. I adopt throughout the highest figures.

BRINES.

	Chloride of Sodium (Salts.)	Sulphate of Lime, (Plaster.)	Sulphate of Magnesia.	Chloride of Calcium, (Pitterns.)	Chloride of Magnesium.	Oxide of Iron.
Saltville	98.390	1.22	0.39	0.00	0.00	(trace.)
Onondaga	95.866	2.54	0.00	0.90	0.69	0.004
Kanawha	79.450	0.60	0.00	0.52	0.85	(trace.)
Cheshire	98.070	1.57	0.00	0.13	0.23	

SALT AS MARKETED.

						WATER.
Saltville	99.18	0.27	0.05	0.00		0.04
Onondaga	97.95	0.04		0.04	0.03	1.24
Kanawha	91.31			1.26	0.43	7.00
Cheshire	98.53	1.26		trace.	0.04	0.20
Turks Island	96 76	1.56	0.84		0.14	0.90
Texas	99.46	0.10	0.08		0.00	0.14
Curacoa	99.85	0.12	0.00		0.03	0.00
St. Kitts	99.77	0.08	0.00		0.01	0.14

Professor COOK adds: "The Kanawha brine contains a considerable quantity of bromide; both iodine and bromide are found in the Onondaga and Cheshire brines." A further evidence of the extraordinary purity of the Holstein salt is found in the fact, that made without lime, it possesses almost the whiteness and transparency of snow.

In point of strength the superiority of the Virginia brine is still more marked.

That of the Kanawha is "about 32 per cent. of saturation." Onondaga "73" while the Holstein brine has stood generally at about 90, or, stated in another form, while it takes upwards of 70 gallons of the Kanawha brine, and 40 of the Onondaga, it requires no more than 20 of the Holstein to make a bushel of salt.

HOW THE BRINE IS RAISED AND THE SALT PREPARED FOR MARKET.

The wells now used at Saltville are artesian borings. There are several of them, but all within a radius of fifty yards. Brine is struck usually at a depth of somewhat under two hundred feet—but immediately rises to within about forty feet of the surface. It is raised by force pumps, driven by steam, to an elevation of forty feet, whence it is conveyed by pipes to settling cisterns, and from them by similar conduits to the boilers. These are hemispheres of cast-iron, containing about one hundred and twenty gallons of brine, and are set, in double rows, over the flues of the furnaces, or "blocks" of seventy or eighty to each block, and averaging about five bushels of salt per day for each kettle. The salt is lifted at intervals of six hours, drained in buckets over the kettles, and then thrown into heaps to dry, and is sacked and ready for shipping in about three months. These figures all vary, somewhat with the weather. It may be interesting to add, that an open shaft, (about eight feet square) sunk some thirty years ago within forty feet of one of the principal wells, reached, at the depth of about two hundred feet, and penetrated some twenty feet further a very fine fossil salt, which was bored into a yet further distance of sixty feet without going through it. It is usually struck also, of varying thicknesses, in the artesian borings. It has not yet been deemed important to mine it, but the increasing esteem in which salt is being daily held as a manure, may render it worth while to see whether a cheaper and inferior article, to that now furnished, may not be advantageously brought into market for agricultural uses.

It may gratify the curiosity of some to trace the steps of this now important manufacture. At the advent of the whites, decisive evidences of the prior presence of the Indians were furnished by the *debris* of an Indian village, or encampment, immediately contiguous to that part of the valley where the soil is most sensibly impregnated with salt. These consist of pieces of broken pottery, arrow-heads, and other rude commodities of stone which then abounded, and are yet, by no means infrequently turned up by the plough, not only there, but at the foot of both gaps of WALKER'S mountain opening into the valley from the south. But the presence at the "lick" of numerous little pits, or basins, fashioned in the soil by the tongues of animals, also everywhere then seen—besides other reasons unnecessary to state here—would indicate rather nomadic than permanent settlements there of the Aboriginals, allowing, in the interim of uninterrupted access of wild beasts. Manifestly the spot was to the Indians an invaluable preserver of game. Innumerable proofs of the countless numbers which used to resort to it, thickly underlying the soil for large distances roundabout—partly, doubtless, the result of their conflict—and partly, no doubt, of the well-known mortal effects of too free indulgence in the highly concentrated brine; but we may be no less sure, these sons of the forest also obtained their salt there, though we do not know whether it was used concrete or in brine. The pits would often, no doubt, be found to contain little pools of brine, trickled into them from the surrounding earth, and in warm seasons, or where long overlooked, crusted at the edges or at the bottom with grained salt. To the more instructed whites, these natural processes pioneered the way to their own first rude salt-works—excavations of a few feet, into which the brine, saturating the adjacent soil, gradually flowed—whence, transferred to some iron household vessel it was boiled down to salt. At length some more adventurous innovator enlarged and deepened the excavations, carried finally to a depth of eighth or ten feet (as I learn from a living eye witness), and obtaining larger kettles, commenced the business of making and selling salt. The sweep, now, instead of the dipper, was needed for these larger operations, and, raising the brine, swung it around to monster twenty gallon kettles, as they were then considered, at convenient distances. This was between 1780 and 1800.

Towards the close of the last century, a stalwart fine-looking man, a Scotchman, with his pack on a little white pony, appeared on the scene, but only quickly to nearly disappear again, for his pony sunk suddenly nearly out of sight in one of the treacherous bogs, whereof that locality still possesses some rather dangerous specimens, and in which he too became rather deeply implicated. Helped out of his difficulty by a benevolent blacksmith hard by, partly, perhaps, because of the sad plight of his far-sent pony, and partly (may it not have been) that some straggling ray already had shot across his ardent brain, revealing some great, though as yet undefined venture lying hid there; so, at any rate, it was, that he sought and found employment with the parties then engaged in salt making—and there set up his household gods. A piece of land lying adjacent, was soon after offered for sale. His employer, the proprietor of the salt-works, refused to buy it because it had been already stripped of timber—which alone gave it value in his eyes. Here was the golden opportunity. For the slight requital, as a well authenticated tradition assures us, of an indifferent horse, and rifle, he became the purchaser of a future principality. He set up his little store—but immediately commenced, also, exploring for salt, opening a large well, which, at the depth of two hundred feet, rewarded his sagacity and enterprise by the disclosure of the finest brine ever yet discovered—and in unlimited quantity. This almost pennyless wayfarer was WILLIAM KING, whose salt and mercantile establishments were soon known to fame far and wide through Virginia, Tennessee, and North Carolina, speedily achieving for him immense wealth; wealth which, honestly made, liberally dispensed, and modestly borne, none ever envied his making or possessing. The property of his former employer, General F. PRESTON, extended to the immediate neighborhood of KING'S well. He, too, a short distance off, now dug for and found, finally, a similar brine. Sometimes separately, sometimes unitedly, these two wells have been operated to the present time. They are now worked by the Holstein Salt and Plaster Joint Stock Company, who own about seven-eighths of both properties.

GYPSUM CONNECTED WITH THE SALT MINES.

In connection with the salt there are found here, also, vast beds of gysum, (vulgularly called at first, "dead salt," and flung away accordingly.) It crops out, at intervals, along the course of the North Fork of Holstein, (crossing the river about midway,) for a distance of some sixteen miles, and exists without in quantities as inexhaustible as, in quality it is unsurpassed. Long acknowledged to be the best specific manure for clover, as of all the grasses, its value is beginning to be better and better understood as a general manure (notably for corn,) while recent experiments seem to exhibit almost marvelous effects from it when applied to cotton. Thus the specific aliment of clover and the grasses, which are the food of stock and the natural improvers of the soil, and through these, as well as directly, of wheat and corn, the food of man, as of cotton (as is now said), his principal wear, it is, probably, in view of its cost relatively to its effects, and will be more and more generally recognized to be, altogether the most valuable auxiliary to agricultural production of all that are known.

The more palpable value, and the more various and exigent uses of salt, coupled with the difficulty of handling and the costly transportation of gypsum (about doubling prime cost each twenty miles by wagon) long led to the comparative neglect of the latter, and its very partial development. Hardly more than one or two thousand tons were marketed in any one year before the war from the salt-works valley, and during it, very little. Since it ended greater attention has been paid to the mining of plaster, and more regularity, method, and permanency given to the business, which is constantly extending. The season just closed will show upwards of 4,000 tons sold against less than half that amount for the preceding one. Of this, the Buena Vista mine, situated on the railroad, half a mile west of Saltville, and operated by the "Virginia Plaster Company," furnished upwards of 3,000 tons—and another, on the river a few miles east of Saltville, the balance. The Holstein Salt and Plaster Company is now opening an apparently very extensive deposit at Saltville, and will be prepared, also, to enter the market the coming season, while measures are also being taken to operate the great and valuable beds lying still higher up the valley.

The specimens of this plaster sent to the Lexington Institute show, by analysis, respectively of sulphate of lime, 78.88 and 76.86, as compared with absolutely pure gypsum, which has 79.07, both being reported to me by Professor SEMMES as being superior to Nova Scotia gypsum, while similar specimens sent to the Smithsonian Institute are stated to me by Professor HENRY, on the information of his mineralogical assistant, to be of decidedly excellent quality.

The market of gypsum is, now, nearly coincident with that of the salt. But the great enlargement, both of its boundaries and its consumption, whenever railroad connection shall be made with the grass regions of Kentucky, is not problematical.

In the beneficent effects of these minerals, salt and gypsum, of which I have been speaking, in cheapening the bread, meat, and clothing of the populations of our town, may be discerned one of the many causes which surely destine them to become, in a near future, important seats of commerce and manufactures, and while I rejoice in the general diffusion of the benefits of those minerals everywhere, I shall not be found fault with for contemplating with most satisfaction the auspicious influence they promise to exert on the growth and prosperity of our Virginia cities, and, above all—of that I am so peculiarly bound to—the city of Richmond.—*Virginia Advertiser.*

Trials of Coals for Producing Steam.

Extract from a "Report on Coals and Iron Ores of Pictou County, Nova Scotia," pages 426–431 of the Reports of the Geological Survey of Canada, 1867–69. By EDWARD HARTLEY, F.G.S.

THE general result of all the trials above described has been to demonstrate the fitness of the coals used, for steam production, whether under stationary, marine, or locomotive boilers. As the result of each separate trial can be compared with similar trials of foreign coals, by reference to any work on standard coals or engineering practice, it seems unnecessary to make any such comparison here.

A few remarks on late experiments on the consumption of such coals, however, may not be out of place, but though of very great importance to our coal trade, a full discussion of the subject will not be practicable, without extending this Report far beyond the limits to which it must be necessarily confined. A prejudice existed for a long period against using bituminous coals as steam-producers, especially in the navy, on account of the large amount of smoke produced in burning them, and their low evaporative power, as compared with anthracites, or the so-called free-burning coals of the Welsh coal-fields. The heavy black smoke emitted from the funnel of a steamer burning these coals, rendered them quite unfit for the use of ships of war, and in towns and cities became a serious nuisance. Their evaporative powers, as has already been stated, were supposed to be dependent on their contents of fixed carbon, which supposition seemed to be quite justified by practical experiments. The most careful trials with the old style of furnaces failed to give them the value of the Welsh steam coals, in proof of which I may cite the final results of the British experiments, (DE LA BECHE and PLAYFAIR'S), in evaporative powers :

Average of	37	samples from	Wales.....	9.05 lbs.
"	17	"	Newcastle	8.37 "
"	28	"	Lancashire.....	7.94 "
"	8	"	Scotland	7.70 "
"	8	"	Derbyshire.....	7.58 "

Of the above list of coals, the coals of the Pictou district approach nearer to the Newcastle Hartley, or North Country coals, than to any other class well known, and it will be, therefore, of the greatest interest to show the change of opinion which has taken place with regard to these coals within the last few years ; to mark how all the old prejudices have disappeared, and to ascertain with what success these coals are now consumed as steam-producers.

To accomplish this object in the most direct manner, I cannot do better than quote from the "Report of a Committee appointed by the North of England Institute of Mining Engineers, to Investigate the Smoke question," (dated October 24, 1860.) After mentioning the causes that led to the appointment of this committee, they state :

"They (the committee) cannot, however, forbear remarking that there is really very little left for them to do. A few years ago (in 1855) there was an impression that North Country steam-coal not only made smoke when burnt, but was of an inferior evaporative power to that of the so-called smokeless Welsh coal. Since then, on two subsequeat occasions, this has been proved, most satisfactorily, to be an error. In 1856–7, experiments were made at Elswick, conducted by Sir WILLIAM ARMSTRONG, Mr. J. A. LONGRIDGE, and Dr. RICHARDSON, which fully demonstrated that Hartley could give, without smoke, 12.9 lbs., and Welsh 12.35 lbs. of water evaporated from 212°, per pound of coal, in an ordinary marine boiler ; and in 1864, Mr. MILLER, at the request of the House of Commons, made a series of experiments, which proved again most satisfactorily that Hartley could give without smoke 10.68 lbs., and Welsh 10.13 lbs. of water evaporated from 100 per pound of coal. Again, at Wigan, in 1867, Messrs. FLETCHER and Dr. RICHARDSON conducted a series of experiments, proving most conclusively that a bituminous coal, more difficult even to manipulate in the fire than the coal of this district, can be economically and *smokelessly* consumed. All these results have been accomplished with the smallest possible alteration of the furnace and bars of ordinary marine boilers. Your committee, therefore, have, from many and various sources, the highest authority for stating that, as far as experiments can do so, the question is practically *solved*, and more particularly in connection with any ordinary quality of round coal, and in Cornish or marine boilers of ordinary construction. It could hardly be expected that any further experiments would produce better or more conclusive results, or be attested by gentlemen of higher reputation and position.

* * * * * * * *

"Believing, as they do, that the semi-bituminous steam-coal of this district can be burned without smoke, so as to give as high, if not a higher and more speedy evaporative power, than Welsh (as might be expected from its chemical composition), your committee can by no means aver that this most important fact is comprehended by the great bulk of consumers ; but they are not of opinion that any further experiments in this direction are necessary, as it seems to them that data on this subject are so numerous already, that the public may be properly left to draw their own inferences thereon.

"If your committee were asked for the reason for so much incredulity on a subject so important to the interests of the Northern coal owners, they would suggest that it, to a certain extent, arises from the fact that the steamships built in the neighboring ports are not, as a rule, by any means successful, either in their attempts to prevent smoke or to obtain the highest results from the coal of the district. These steamers, going from port to port, and from country to country, assist in advocating the views of those who refuse to recognize the value of the Northern steam-coals, and your committee regret that the boilers of these ships at least are not constructed so as to bear out the results so laboriously obtained at such great cost." *

Many of the statements in the above extract will apply with almost equal force to our own coals. It is scarcely possible that we shall obtain the very high results in evaporative power above indicated from the Pictou coals, from the fact that the amount of ash in these coals almost invariably exceeds that in the coals of the North of England ; but it is certain that, with proper furnaces, the evaporative power of our coals may be materially increased, probably to the extent of from twenty-five to thirty per cent., and there seems no reason to doubt that, in the matter of smoke, our coals may be as successfully burned as those of the North Country.

In this connection, it will be interesting to examine into the success with which the Newcastle coals are burned without smoke, and to this end an abstract of the experiments of Mr. T. W. BUNNING, of Newcastle-on-Tyne, on the steamer "Weardale," will most conclusively show the wonderful improvements made from the results of the old system of burning the coals, by a very slight change in the furnaces and bars. A series of smoke trials were made on this steamer with the ordinary furnace, fitted with grate-bars five feet long, and the exact amount of smoke produced by Hartley coal was obtained by a method presently to be described. An alteration was made in the furnaces, which consisted simply in shortening the bars to three feet six inches, and introducing an *air-plate* (of fire-bricks, with open spaces between them, hung on iron bars,) at the back of the fire. Underneath this air-plate was a flue, or open space, separated from the ash-pit of the furnace by a cast-iron plate, carrying the brick forming the bridge proper of the furnace. This cast-iron plate was pierced with a hole, giving communication between the ash-pit and air-plate flue, when open, and thus admitting air between the fire and the chimney, through the spaces between the fire-brick forming the air-plate ; or this hole could be closed by a shovelful of ashes and cinder. Beside these simple alterations, the furnace doors were fitted with perforated flash-plates, through which the air was allowed to pass into the furnace, in front of the fire, but above the grate. After the alteration, another series of experiments was tried with the steamer, and with the most signal success. The results were published in the "Transactions of the North of England Institute of Mining Engineers," and accompany a short paper by Mr. BUNNING, a portion of which will subsequently be quoted. As it will be impossible to reprint in full the tabulated results of these trials, it will be necessary to explain the method adopted (and now, I believe, agreed to as the standard by the Imperial Government,) for estimating the exact amount of smoke produced by a given coal, consumed in the furnaces of any particular steamer. It is this : Let the smoke issuing from the funnel of a steamer be noted every minute for an hour, upon a blank table, subdivided into minute columns, similar to the table published with the Acadia coal trial on the steamer "St. Lawrence," (Trial No. 2, of this Report). Let the figure 1, placed in a minute space, indicate that the very faintest possible smoke, a mere indication of light-colored gas was visible ; 2, that this was increased, and so on to 6, indicating the densest black smoke. Having obtained these *smoke-marks* for an hour, the addition of them gives the *smoke-equivalent* for that time. This understood, the extract from Mr. BUNNING'S paper, above referred to, will become intelligible to the reader. After referring to the tabulated record, showing the smoke-marks for every minute during his experiments, he states :

"It will be seen that, before the alteration, this smoke-equivalent averaged 107.9 over 25 experiments ; that frequently, and for several consecutive minutes, dense black smoke was issuing from the chimney, and that there was rarely any actual cessation from smoke ; while, after the alteration, no smoke of greater intensity than 2 was ever visible, and this only nine times in eighteen hours, for a minute each time ; and that, during the same eighteen hours, the average smoke-equivalent was 7.7, each mark so rarely exceeded 1. This indicates that the very faintest possible smoke was visible only for 7.7 minutes in each hour, no smoke whatever being visible for the other 52.3 minutes. It would be vain to look for, nor, indeed, can any better results be found, even when the best of the so-called smokeless coals are burned ; for all practical purposes, therefore, good Hartley coal, as consumed in the "Weardale," may be considered as smokeless as any other known coal. The plate* shows the alteration made to the fire-bars and bridge ; the former were reduced from 5 feet to 3 feet 6 inches. The doors were not changed, and those shown are those used by the Admiralty, admitting air at the bottom. †

"The secret of burning the North Country steam-coal, and, in fact, all other good steam coal, is to put it on as large as possible, as thick as possible, and to have as great a draft as possible, so as to burn off as large an amount per square foot of grate surface as possible." ‡

Since these trials, which were carried out in the winter of 1868–9, farther experiments have been made by Mr. BUNNING on the Weardale, and some slight alterations made, among which may be mentioned the placing of a door at the hole piercing the plate between the ash-pan and air-plate flue, which being moved by a bar extending to the front of the furnace, permits the admission of air, *at will*, behind the fire. Under date of 14th April, 1870, Mr. BUNNING (to whom I am indebted for much information on this subject, which I would here gratefully acknowledge,) writes me :

"We consider the Weardale now perfect ; she makes absolutely no smoke, and keeps her steam well."

A proper discussion of the rationale of these experiments, and of their importance to our coal-trade, must be postponed to some future occasion. Much more might be said in favor of the use of steam-coals of the class under consideration, and it can be clearly proved that, if properly burned, they are at least as economical, as smokeless, and as easily stoked as any other class of coals.

The experiments above quoted, in connection with Government trials made at Devonport, already mentioned, have produced a material change of opinion with regard to Newcastle coal, and it has now taken a position second to none, among coals for the Navy, where it is chiefly used in admixture with Welsh coal, and the testimony of the very highest authority, is that a very large saving has already been effected by its use.

It is hoped that enough has already been said to call the attention of our coal owners and consumers to the urgent necessity of practical trials of a similar character to those above mentioned. Such experiments could be carried out at a very trifling cost, on any steamers, without interfering with their regular voyages ; and though the great results of the North Country experiments might not be obtained, still a great addition would be made to our knowledge of the coals, and that a very material improvement in the matter of steam and smoke would be made, cannot be doubted.

I shall close these remarks, which have already exceeded the length originally assigned to them, by an extract from a circular of the Coal Trade Association of Newcastle-on-Tyne, just received from Mr. BUNNING. It is of interest, as showing the results of the very latest trials.

RESULT OF EXPERIMENTS AT PORTSMOUTH, 1869–70.

"A very comprehensive series of experimental trials have been carried out during the past twelve months on board Her Majesty's steamers 'Urgent' and 'Lucifer,' at Portsmouth, with Welsh and North Country coal mixed, and burnt in two forms of furnace, for the purpose of ascertaining the best proportions in mixed coal and form of furnace for the consumption of smoke. The trials have been carried out under the direction of Captain E. RICE, A.D.C. to the Queen, commanding the Steam Reserve at Portsmouth, and the superintendence of Mr. G. MURDOCK, Chief Inspector of Machinery to the Reserve ; and the results are considered to be so important, that orders have been issued from the Admiralty for the furnaces in the boiler-rooms of her Majesty's ships to be altered according to the plan finally adopted in the trials as the best for the consumption of smoke. When the comparative trials between the ordinary and the new form of furnace commenced, the proportions of the mixed coal burned were one-third North Country and two-thirds Welsh ; but in all the later trials the coals have been burned in equal proportions, and under these latter conditions less smoke has been emitted from the smoke-consuming furnace funnel than has been emitted from the funnel over the ordinary form of furnace, when the latter was burning the very best description of Welsh coal. The last three trials made on board the 'Urgent' afford conclusive evidence of the success of the new form of furnace over the old. In the trial made on the 27th ult., both sets of furnaces were used, the coal burned being Ferndale and Cowpen's Hartley, in equal proportions. The report of this trial gave the following results :

	NEW FURNACE.	OLD FURNACE.
Smoke.....	1.55	4.55
Coal burned per hour....	2,940 lbs.	3,294 lbs.
Producing ash.....	23.14	32.75
" soot.....	2.82	5.17
" clinker.....	35.08	25.00

"The last two trials made were on the 2d and 11th instants, the new furnaces only being used on the former, and the old furnaces only on the latter trial, the coal burned in each instance being equal quantities of Powell's Duffryn and Cowpen Hartley, with the following results :

	NEW FURNACE.	OLD FURNACE.
Coal burned per hour....	2,912 lbs.	3,497.3 lbs.
Producing ash.....	17.73	24.34
" soot.....	1.94	4.06
" clinker.....	31.9	40.6

"In these two trials the new furnaces exhibited a saving upon the old of 14.28 per cent. in fuel, an increase of 7.56 per cent. in horse-power, and a positive gain in the consumption of 21.84 per cent."

Cold Blast, Warm Blast, Hot Blast.

THE last two are relative terms ; and considering that the natural temperature of the air varies from 100° above to one-half as many degrees below zero, in this latitude, strictly speaking, all are relative terms. In the iron trade of this country, however, a blast heated up to not exceeding 450° Fahrenheit, is said to be warm ; from that up to the melting of lead, and somewhat above, has been called hot blast. But of late, some of our furnaces reach 900°, and in England 1,200° is said to have been attained. If we retain the nomenclature which forms our heading, a new term will have to be added—we suggest red-hot blast. And this is the literal fact ; air and all other substances begin to show a dull red at between 900° and 1,000°. Furnaces are now running in Pennsylvania where the goose-neck pipes are so hot as to light up the tuyere arches at night.

One advantage of heating the blast is very apparent ; cast iron melts at about 2,800° Fahrenheit. Now, all air going through the furnace must be raised to this temperature. If we put the air into the furnace at 400°, we evidently save one-seventh of the fuel required to heat the air—a very important item, when we consider that it takes about ten tons of air to produce one ton of iron.

But this is not the whole, nor even the greatest advantage, as all know who have made hot and cold blast iron in the same furnace, for experience shows that the saving of fuel is from twenty to fifty per cent. in using hot against cold blast, and the make increased in a still greater proportion. This is due to the increased chemical affinity found to exist between heated air and coal. Combustion takes place more rapidly—hence, is more intense and concentrated. No more units of heat are evolved, but the combustion is confined to the more immediate vicinity of the tuyeres. It is well known that cold-blast furnaces are hotter in the upper parts than hot-blast furnaces, while in the latter the zones of reduction and melting are lower down in the furnace. The gases raising from this deep-seated

* "Transactions North of England Institute of Mining Engineers," vol. xviii., pp. 37–38.

* Published with Mr. BUNNING'S paper.

† That is, the bottom of the door ; the air passing into the fire through a perforated flash-plate.

‡ "On Experiments on the 'Weardale.'" Trans. N. E. Inst. Mining Engineers, vol. xviii., pp. 106 et seq.

region of greatest heat, give out their caloric to the descending stock, thus thoroughly preparing it, and finally leave the furnace-mouth at a lower temperature than those of cold-blast furnaces.

The reason of the increased intensity of combustion due to heated air has been explained by supposing the rarified oxygen to more easily permeate the pores and interstices of the fuel, thereby increasing the surface exposed to the oxydizing influence. Whatever the explanation, the fact is established, that hot blast produced iron faster in any given furnace, and with less fuel, than cold blast. No limit has yet been found. Theoretically, there must be carbon enough to act as a reducing agent; but practically, the amount of heat that can be employed seems likely to be limited by the difficulty of keeping joints tight, and working about highly-heated pipes.

As to its effect on the quality of the iron produced, there has been much discussion. When we consider that within the experience of many of our older iron-masters, all the iron made in the world was cold blast, and that now it is nearly all hot, we need have no serious apprehensions as to the future of the hot-blast metal. Producers and consumers of cold-blast iron, who had made money in the trade, were naturally opposed to any change which looked to a rebuilding of their furnaces and a reviving of their traditions.

Iron workers are conservative. Again, there is a universal belief among men that what costs the greatest amount of time, material and money to produce, must be the best, (and it is not a bad general rule), hence, that this cheaply-produced, new-fangled pig metal, was of an inferior quality. Again, the hot-blast men soon found that they could produce good metal from sulphurous and other inferior ores, that had before been considered worthless. This was bringing "good out of Nazareth," and was against them. But time has changed all this; it would now be impossible to make all the iron consumed in the world, if done by cold blast. English hot-blast mineral fuel iron is now put to some of the most trying and important uses, for which, a short time ago, only cold-blast charcoal iron was deemed fit.

But there is often a difference between cold and hot-blast iron, and it is not improbable that some ores may produce a better iron worked cold than hot, in the present state of iron metallurgy. Intense heat in the furnace tends to reduce the silica, and leave its metal silicon in the pig, where it is objectionable for some uses, particularly for bar iron. This can generally be corrected by using a larger amount of lime, which, uniting with the silica, carries it off in the slag. It would be well for furnace men proposing to raise the temperature of their blast, to bear this in mind. To illustrate and apply these suggestions in Lake Superior practice, let us look for a moment at the

DEER LAKE FURNACE.

The stack is thirty-three feet high, seven feet eight inches bosh, hence, probably, the smallest furnace built in the United States within five years—and in this particular, a grave mistake. The furnace runs but six days in a week, banking up on Saturday nights at 12 o'clock, and starting again the following midnight. This practice we believe to be a mistake, not only from the money-making standpoint, but on true moral and and religious grounds; but it is neither to the size of the furnace nor to its religion we desire to call attention here, but to its *enormous hot-blast oven*, and the remarkable results of its producing. This oven, arranged on PLAYER's plan, contains forty-five tons of metal, which is fifty per cent. more than found at our largest charcoal furnaces, having twice the capacity of the Deer Lake stack. The furnace is driven by water, hence all the gas is available for heating the blast, and being all collected by the cone and thimble arrangement, is burned in the great oven, which heats the blast near to red hot. Messrs. WARD & HALL have no means of measuring the temperature; they only know that it is a great deal hotter than the melting of lead.

As to results: The furnace has averaged eleven tons per day for three weeks on 110 bushels of coal per ton, one-half of which was soft coal, mostly pine-tops. New York hard ore only was used, averaging sixty-six per cent. We know that somewhat better work has been done, but considering the great disparity in the size of the furnaces, and the inferior quality of the coal used at Deer Lake, and the weekly stoppages, this is extraordinary work. We also know that the concern is very well managed, but believe that the above record is chiefly due to a very large hot-blast oven, and to the fact that all the gas is available for heating the blast.

Application: Proprietors and manufacturers of hot-blast water furnaces, running on L. S. ores, had best follow the lead of Deer Lake—tear down their ovens and build larger. The thanks of the charcoal iron-makers of this region are due to Mr. WARD, for having pioneered *red-hot blast* into Lake Superior practice. If any furnace man wishes to know about how much money it is costing him to support the magnificent flame out of the mouth of his furnace, let him build a fire of corresponding size on the fill-plate, feeding it with charcoal at thirteen cents per bushel, (stumpage and kiln rent in); he will know at the end of a month what it costs to be a "fire worshipper."—*Marquette Mining Journal.*

Answers to Correspondents.

G. CAREY THARP, Liverpool, Pa.—There is no work of the exact kind you inqure about published in the English language. If you understand German, read GAETSCHMANN, "Die Auf und Untersuchung der Nutzbaren Mineralien." You can get it of B. WESTERMANN & Co., No. 471 Broadway, New York. Some observations relating to the subject are contained in the Report of R. W. RAYMOND, United States Commissioner of Mining Statistics, now being printed at the Government printing-office at Washington. You can get it through your Representative in Congress. See, also, COTTA's "Ore Deposits," translated by FREDERICK PRIME, Jr., M. E., and for sale by VAN NOSTRAND, New York.

MINING SUMMARY.

Colorado.

BULLION SHIPMENTS.

The Central City Weekly *Herald*, of July 12, publishes a statement of the monthly shipment of bullion for June, and, in addition, gives the shipments for the first half of the current year, with the following remarks: "By a comparison of shipment for the same months during 1868 and 1869, it will be seen that the shipments of 1870 hold remarkably well, when it is considered that the stoppage of the Gregory, Briggs, and the Smith & Parmelee mines, have lessened the production and shipment nearly $100,000 in coin value, during the past six months. In a financial point of view, however, the profit has been greatly affected by the fall in the currency value of gold. There has, by no means, been a corresponding concession in wages and material. The expense of obtaining an ounce of bullion during the last six months, has been very nearly as great as for the corresponding periods of the two preceding years, but the greenback value has fallen very considerably. All labor and supplies being paid for in currency, it makes a serious difference whether the ounce of gold brings $17 or $22 in greenbacks. This depreciation of the product, added to the stoppage mentioned, has had a severe effect on general trade, whilst it has, in addition, worked seriously against the development of new sources of production. A wise consideration of these facts ameliorates the otherwise depressing influences arising from the prevailing dullness of the season.

"The Grass Valley Company shipped, during the last ten days, $9,800, and promises to send $20,000 during July.

"The shipments of gold from the three banks of Central for the month of June, were as follows:

	CURRENCY.	COIN.
Warren Hussey	$50,000	$44,650
J. B. Chaffee & Co.	49,500	44,200
Rocky Mountain National	30,500	27,250
Total	$130,000	$116,100

"The following is the total coin shipment for the six months, from January 1 to July 1, 1870, by months:

January	$106,000
February	107,000
March	114,050
April	78,000
May	112,500
June	116,100
	$633,650

"The coin value of the shipments for the first six months compares as follows with that of the corresponding time for the two previous years:

	1868.	1869.	1870.
January	$80,000	$77,000	$106,000
February	95,600	85,800	107,000
March	75,000	101,700	114,050
April	79,000	108,000	78,000
May	104,000	116,000	112,500
June	106,000	147,000	116,100
	$539,600	$635,500	$633,650

"During four months, ending June 30, 1870, WARREN HUSSEY sent East silver bars weighing 18,429 ounces, of a coin value of $18,411 97, from the Coaley mine, Blackhawk, worked by A. D. BREED, Cincinnati, under the management of Messrs. CUTTER and W. F. ALLEN."

The *Herald*, of July 8, furnishes this golden item: "The bullion shipment from Gilpin county (gold) for the year ending July 1, was as follows:

	COIN VALUE.
July	$124,000
August	161,500
September	122,000
October	110,000
November	120,500
December	106,500
January	106,000
February	107,000
March	114,000
April	78,000
May	112,500
June	116,100
Total for the year	$1,378,100

"The bullion shipments for the twelve months previous to July 1, 1869, coin value, were 1,267,900."

THE SMITH & PARMELEE COMPANY.

The same paper says: "The Smith and Parmelee mill commenced a few days ago, on ore from the Fiske and other lodes belonging to the company. The water in the Smith and Parmelee mine is now within forty feet of the surface."

THE WYOMING COMPANY'S TUNNEL.

The Georgetown *Miner*, of July 14, says: "The Wyoming Silver Mining Company, GEORGE L. SITES, Superintendent, are engaged in driving a tunnel in Leavenworth mountain, to cut the celebrated Ni-Wot lode, which is owned by the company. The tunnel is six feet wide by six and a half high, and will be 155 feet in length when completed, penetrating the lode at a depth of 105 feet. Fifty-five feet has been driven. Thirty feet from the entrance to the tunnel the Lebanon lode was cut, at a depth of eighteen feet, disclosing a two and a half feet crevice, with from three to five inches of play, principally quartz and sulphurets of silver."

NEW SILVER MINES IN BOULDER COUNTY.

The silver mines of Grand Island District, Boulder county, are beginning to attract attention, according to the Colorado *Herald*. They are about twenty miles distant from Central. "The road is good, the mountains in the vicinity of the mines are smooth, easily travelled over, but covered with a deep slide, so that finding new lodes requires hard work and a good deal of perseverance. Cultivated ranches are within three miles of the mine. A new town has been started, and twenty houses built. A grocery store was organized day before yesterday, and two boarding-houses have been in full blast for a week or so. The Caribon is at present the most important mine. The shaft is eighty feet deep, and a drift has been started, from which ore is being taken of a very valuable character, in sufficient quantity to keep three teams—three yoke of oxen—hauling constantly to Prof. HILL's works. They make two trips a week. The 'Sovereign People' is also a very good lode, though but slightly developed. The ore vein is strong and very rich. There are probably not so many lodes as in the Georgetown district, but there are a few very valuable ones, and the prospects of the district are very flattering.

"Mr. JOHN BAKER, the discoverer of the celebrated Baker lode, Georgetown, has made two trips to these mines, and gives a very favorable report of them. He has found six lodes, four of which he believes will prove to be valuable. One in particular, which he calls the 'Collison,' is very promising. The solid ore vein crops out at the surface, and is a foot wide. It looks better than the Baker when first discovered. The crevice is about three feet wide. It is situated a mile and a half west of the Caribon, and on a line with that lode. He has two other discoveries in the same locality, which looks well, but as yet they are undeveloped."

California.

THE AMADOR MINE.

We have the report for 1869. The receipts were $706,080 66, and there was disbursed for mining 33,000 tons of ore, $160,447 71; improvements made at mine, $25,835 70; milling 32,510 tons of ore, $64,186 64; improvements and construction of Eureka mill, $32,366 53; sundry accounts, $36,253 53. After paying the above there remained $384,800, which was paid to the stockholders in dividends.

CHLORINATION.

The works of BREEDLOVE & BURR, Sutter creek, are running on sulphurets from the Keystone mine, at Amador City, paying about $150 to the ton.

BUTTE COUNTY—SPRING VALLEY WATER COMPANY.

The Chico *Enterprise* of the 16th says: "Work on the canal, between Concow valley and Cherokee, is progressing rapidly. They are working 250 men, and about 1,000 feet of the pipe is on the ground. The timber for the bridge across the west branch, to hold the pipe, is on the ground. The iron work is being manufactured in Marysville. The 30-inch pipe is to be buried in the earth, and the trench for this in many places has to be blasted out."

Arizona.

Mr. I. R. RYAN, recently returned from Arizona, publishes the following items: The Big Bull mill has stopped running, and the hands have all been discharged. Failure of the ore to pay is said to be the cause. At the Vulture mine, the lowest level was 240 feet in depth, at which the ledge did not appear to pay. Consequently the Superintendent, Mr. TAYLOR, has discontinued work on this level, and recommenced at the surface. At the second deepest level the ore was remarkably rich. At the Ravenna Conquest mine at La Paz, ore going over $1,000 a ton is being taken out. Shipment of a few sacks of this ore have recently been made to San Francisco and New York. At the Martinez district, near Date creek, an arastra was crushing some of the ore, which was remarkably rich. Mr. ROBERT BARTON went down on the last steamer, and will probably proceed to the erection of a small stamp mill at once. These are all gold ledges.

Utah.

THE SNAKE RIVER MINES.

The Humboldt *Register*, July 23, contains an article founded on a report by a recent visitor to the Snake River mines, declaring that "the reported rich discoveries and strikes are base fabrications, circulated by interested parties, who expect to enrich themselves at the expense of the dupes who give credence to their reports and rush to the mines."

Montana.

RED MOUNTAIN CITY.

A correspondent writes in the Deer Lodge *Independent* as follows from Red Mountain City, under date of July 9: "J. F. BECK has struck a silver lead that promises to be as rich as any yet discovered in Montana. It is four feet in width, and has every appearance of being a true fissure vein. The Red Mountain Flume Company expect to strike bed-rock in a few days. They have a fine bed of gravel and obtain light prospects. GEARY, STAMPS & Co. are still at work on their drain ditch. The Langworthy Flume Company have reached bed-rock and obtain as high as a dollar to the pan. They have picked up several fine nuggets, the largest of which was worth $127. JOHN KANN & Co., on No. 28, at the mouth of Horse Gulch, are drifting, and are taking out good money. WM. OWSLEY & Co. have struck bed-rock and obtain fair prospects. Mr. OWSLEY is also building a large reservoir in the main gulch. The Only Chance Company are reducing richer ore than at any time heretofore. Their new arastra will be completed next week. NEVINS & Co. are running arastras with good results. DICKEY & PARKS, on Moose Creek, made a fine clean-up last week from ore taken out of the Dixie Lode, on Gold Hill. HARVEY & DAY, on Moose Creek, are erecting an arastra to be used in reducing silver ores from the S. C. Day and B. F. Harvey lodes. Mr. H. D. MANSFIELD recently discovered a gulch about eight miles west of this place that promises to yield good wages.

RADERSBURG.

A letter from Radersburg gives the following items: "Our mills are doing better than was anticipated. Messrs. KEATING & BLAKER have expended some $15,000 upon their mill. There is little room to doubt that they will realize this amount in addition to current expenses during the next six weeks. The mill of GEO. H. SAMPLE, Esq., bids fair to be a perfect success. The placer mines of Radersburg have yielded handsomely this year, and all classes are well satisfied with the future prospects of the place."

HENDERSON GULCH.

Messrs. WALLWORK and DAVIDSON report the miners at Henderson as doing well, but that water is getting quite low, and, should no more rain fall this season, many of the miners will be compelled to suspend operations in a short time. The laborers of the camp are about equally divided between whites and Chinese. A claim was recently sold to the Chinamen for $1,500.

PILGRIM BAR.

Messrs. HALCOMB & BEERY, on Pilgrim Bar, recently, in one week, cleaned up $4,281. CATCHING & Co. cleaned up a little over $3,600. FISHER & Co., on Granite gulch, took out $900. We have not got the exact figures from other claims in that region, but they "pan out" about as usual. Several claims are now idle for want of the propelling fluid.

LARGE SHIPMENT OF GOLD DUST.

On the 13th ult., R. W. DONNELL & Co., shipped from Deer Lodge City, per WELLS, FARGO & Co., 1838 ounces, or 153 lbs. of gold dust, valued at $34,000.

Nevada.

BELMONT AND ITS MINES.

A correspondent of the Eiko *Independent*, writing from Belmont, July 15, 1870, says: "The mines of Belmont were never, in their most palmy days, so encouraging as at the present time; and if it were a new discovery, with the present yield and fine developments, it would produce a wonderful excitement. The ten-stamp mill is being run regularly by Mr. CANFIELD, on ore extracted from his mine, which is furnishing very fine ore and yielding a constant stream of bullion. I am not prepared to say how much it pays a ton, but feel safe in saying that it ranges from one to two hundred dollars on an average. The mine looks remarkably well, and is so well defined as work progresses, that no doubt Mr. CANFIELD will erect a mill and steam hoisting works at an early day. The El Dorado mine, owned by LEON, MUFLEN & SINGLETERRY, has never looked so well as at present. They are now only working a small force, and are on a level with the water, 240 feet deep, where they have cut through the ledge, and find it to be from eight to ten feet thick, of fine quality, paying from two to three hundred dollars

per ton; which, together with the large amount of money taken from near the surface, establishes the fact beyond a question that it is one of the best mines east of Virginia. This company will doubtless erect a mill and steam hoisting works at an early day. The Combination mill and mine is lying idle; not because the property is worthless, but for other reasons best known to the company. The company has a fine 40-stamp mill, and, beyond question, a mine of great value. The above are not all the mines of known value, which have been worked more or less, and from which much good ore has been extracted—a few of which I will speak of, viz.: The Arizona and the Northern Extension of the El Dorado are mines that have been proven to be good, while many others show excellent prospects. A new era is dawning, and Belmont will soon take a place in the front ranks as one of the most prominent camps of the State of Nevada. I close this letter by saying that I am not interested in the least in mines or any other property in the district, and have no other interest in writing you than to furnish some facts that may be interesting to the public."

SPECIAL SCIENTIFIC BREVITIES.

Water Pipes.—M. GAFF communicates, in the *Journal of the Franklin Institute*, information in relation to what seems to be a good method of preserving water-pipes against corrosion. The pipes alluded to, made of wrought iron (boiler-plate), seven feet in diameter, were completely preserved against corrosion by being painted, while hot, with boiled coal tar; an attempt to protect the pipes by strips of zinc entirely failed. Nothing is said as regards the cause of the corrosion, but the pipes are used to convey water for drinking and domestic purposes.

Behavior of Permanganate of Potassa with Sulphuric Acid.—Dr. SPEISS, in a recent paper, states that while he was engaged preparing from a mixture of permanganate of potassa (the dry salt) and concentrated sulphuric acid-ozone, he was astonished by the appearance of violet-colored vapors, which at first he believed to be due to iodine, and consequently an impurity of the salt alluded to; on investigation, however, no iodine was found at all; on repeating the experiment, the author obtained what he thinks is a new, hitherto unknown, compound, but his researches on this point are not quite finished.

A New Mineral.—F. VON KOBELL, in the *Journal für Pratischen Chemie*, gives a description of a new mineral called RABDIONITE and also an account of ASBOLAN. Rabdionite has a specific gravity of 2·8, is black colored while in solid lumps, its powder is deep brown; it fuses readily before the blow-pipe; yields, with borax, a blue-colored head, is completely dissolved by hydrochloric acid, chlorine being evolved; in 100 parts it consists of peroxide of iron, 43·00; oxide of manganese, 13·01; alumina, 1·4; oxide of copper, 14·0; protoxide of manganese, 7·61; protoxide of cobalt, 5·10; water, 13.5. Formula:

$$\left.\begin{matrix}CuO\\MnO\\CoO\end{matrix}\right\}\begin{matrix}FeO_3\\MnO_3\end{matrix} + 2HO;$$

The asbolan alluded to by the author is a mineral found near Saalfeld; it contains a small quantity of lithia, but chiefly oxide of manganese, which constitutes 54 per cent. of the whole.

Inclination of the Axis of the Basilica of St. Peter at Rome.—In *Les Mondes*, of June 16, 1870, it is stated that M. Crozes, a barrister from Albi, France, while temporarily sojourning at Rome, and minutely inspecting the celebrated Basilica (church), found that the main lines (centres) of the dome and the western main entrance of the building, do not, as they should, coincide, but are no less than 1·5 metres mutually out of the plumb-line. (The building was not constructed by one architect—the dome being the work of Michael Angelo and the rest that of Carlo Maderno.) This defect, it appears, has never even been found out, even in modern days; and, on being consulted on the subject, was found to be unknown, as well to the Rev. Father SECCHI, S. J., as to Chevalier MARTINUCI, Professor SARTI, Count VESPIGNANI, and other scientific and architectural authorities at Rome, who, however unwilling to believe, cannot deny the fact as ascertained, and, as stated above, to have been accidentally discovered by a non-professional, but an unprejudiced observer. The matter, as may be readily imagined, is now to be thoroughly investigated. But the writer of the letter above alluded to states that the main fact, as discovered, remains, as yet, undisputed.

Poisoning by Blast-Furnace Gases.—Dr. PERCY, of the Royal School of Mines, Jermyn street, writing to the *Times*, says: "It is reported that four men have been killed at iron works in North Staffordshire by what is termed 'waste gas from the blast-furnaces.' The poisonous ingredient of that gas is carbonic oxide, and the inhalation of it in very small quantity, whether pure or mixed with common air, rapidly destroys life. I have collected and published several cases of fatal poisoning from that cause at iron works, foreign as well as British. A few years ago the engineer of the Dowlais Iron Works was suffocated in his office by the escape of this gas from an adjoining culvert. It is important that the managers of such works should be acquainted with its highly poisonous nature, and take every precaution to prevent their workmen from being exposed to its influence. As the use of waste gas from our blast-furnaces for heating steam-boilers, mine kilns, &c., is extending daily, it is to be feared that deaths from its inhalation may become more frequent than hitherto, unless those who deal with it are fully instructed concerning its action on man. With the hope of communicating such instruction as widely and as quickly as possible, I beg to submit this letter for your consideration."

Sodium as a Flux for Minerals.—Metallic sodium is now made in such quantities as to have become a valuable reducing agent in the hands of chemists. We have previously published, says the *Journal of Applied Chemistry*, a notice of its use for the detection of sulphur and phosphorus in compounds, and the same author, Dr. SCHONN, now proposes to extend its use to the resolution of minerals in general. A steel crucible 1¼ inches deep and the same in diameter, is easily brought to glowing over an ordinary lamp; into this is projected a few pieces of metallic sodium, and afterwards the finely divided and dry mineral is added. The crucible is then covered and heated red hot. As soon as the reaction is finished the contents of the crucible are allowed to cool, and water is cautiously added, sufficient for the purposes of filtration. The fused mass is then thrown upon a filter and thoroughly washed. In the filtrate will be found the electro-negative constituents of the mineral combined with the sodiums, such as sulphur, cyanogen, chlorine, chromic acid, silica, molybdic and tungstic acids, and such oxides as are soluble in soda lye. On the filter will be found the metals and their oxides, also the lower oxides of titanium, molybdenum, tungsten, and possibly silica and alumina. The contents of the filter and the solution in the filtrate can be further treated according to the order of analysis. In this way all minerals can be readily resolved, and their constituents determined either qualitatively or quantitatively.

ON DIT ABOUT MINES AND METALS.

Colorado Fair.—The next annual Territorial fair of Colorado, to be held at Denver, September 28, 29 and 30, will contain samples and specimens of the mineral wealth of the whole Territory.

Farlie Engine for Mexico.—The directors of a Mexican Railroad are carefully considering the advantages of the Farlie system of engines, with a view to adopt them as far as is practicable.

Grindstone Quarries in Michigan.—There are two grindstone quarries in Huron county, Michigan, at each of which 2,000 gross of grindstones are manufactured annually; whetstones, heel stones, etc., are also made at these quarries.

A New Silver Lead has been discovered thirty miles from San Bernardino, Cal. The rock from the Green lead, by the arastra process, shows $56 to the ton. A new mining district, embracing the late quicksilver discoveries, is organized in San Bernardino.

A Regular Paying Mine.—The Eureka mine, at Grass Valley, California, is perhaps the most regular paying institution on the Pacific slope, never yielding below $2,000 a day, and often largely exceeding that amount, and the same may be said of the Idaho, the claim adjoining, in proportion to the number of stamps in operation.

Reduction Works in Omaha.—Some of the leading capitalists and citizens of Omaha are taking steps towards the erection of works for the reduction of Utah lead and silver ores in Omaha. Mr. A. L. KING has left Omaha for Newark, in search of needed facts and figures upon the subject, which we hope will result in good to this important interest.

Pittsburgh Blast Furnaces.—There are now seven blast furnaces in successful operation in Pittsburgh, the largest of which has a fourteen foot bosh, fifty foot stack, and a capacity of one hundred and seventy-five tons per week. The total capacity of the seven furnaces is estimated at fifty-four thousand tons per annum, and the actual production at forty-eight thousand tons.

The Long Island Iron Sand Factory.—A recent visit to the Iron Sand Works at Quogue, L. I., revealed the fact that although Mr. CARTIER has not been as successful as was anticipated, he still has hopes of the ultimate success of the enterprise. He is now making regular shipments of concentrated sand to New York, where it is manufactured into superior steel for edge tools, etc.

Nickel.—H. BOUILLET finds it unnecessary to have the solution intended for the galvanic deposition of nickel absolutely free from alkalies and alkaline earths, as stated by M. ADAMS. In proof of this assertion, he shows a piece of nickel deposited from the double sulphate of nickel and magnesia, by Prof. JACOBI, of St. Petersburg, by the use of nickel anode, which was converted into a spongy sub-oxide of nickel, and not entirely dissolved.

Two New Blast Furnaces are to be built on the island below Albany, N. Y., by a new corporation, the Corning Iron Company. Five per cent. on the amount of stock has been paid in, and a call has just been issued for ten per cent. more, payable on or before the 15th of each month, until the 15th of April next. Two furnaces are to be erected, and the contracts for their construction have all been awarded, the buildings to be up and in readiness for use by May 1, 1871. A dock is to be ordered along the river front, over four hundred feet long. The amount of contracts thus far awarded amount to $237,000.

No Puddled Bloom that is used in or about the city of Pittsburgh is larger, as it leaves the squeezer, than eight inches in thickness; yet LEWIS & ROSSITER, of that city, are now making a puddle train that is to take a squeezer bloom eleven and a half inches thick, and about four feet long. The squeezer used is a Winslow squeezer, having a steam ram or "set up" attached. The puddling furnaces are to be the Danks Patent Rotary Furnace, now successfully in use at Cincinnati. Each ball is to weigh seven hundred and fifty pounds (one ball to each heat), and after squeezing and then hammering it is to make the rail complete—one ball to each rail.

Iron.—Dr. BECK, of New York, has prepared the following statistics, for 1869, of the production and consumption of iron in various countries. The numbers express hundred weights:

	Production.		Consumption.
	Per Int'e Pop'n.	Per Ind'l.	Per Ind'l.
Great Britain	130,000,000	300	100
France	24,000,000	60	53
United States	20,000,000	75	100
Zollverein	14,550,000	36	38
Belgium	7,250,000	100	64
Austria	6,750,000	18	19
Russia	6,000,000	5	8
Sweden and Norway	5,000,000	100	12
Australia	2,000,000	..	..
Spain	1,200,000	6	10
Italy	750,000	4	8
Total	177,500,000		

A Great Natural Soda Mine.—The Carson (Nevada) *Appeal* has the following: "The Nevada soda mine, owned by JAMES DUFFY, of this place, of which we have several times made brief mention, and which is situated about sixty miles hence on the old Reese river road, proves to be a more extensive deposit, and consequently a greater fortune to the proprietor than was at first supposed. It is in the midst of a great desert—the lower portion thereof—is about seven acres in extent and of unknown depth, having been prospected in the pure article, with but slight interruption, down eighteen feet. At the depth of a few feet the soda is quarried with sledges and wedges, being more solid than ice, which in some respects it resembles in appearance. The supply would seem, from present prospects, to be inexhaustible, as the article is in constant process of formation. In the spring the mine is frequently several feet under water. We are informed that the quartz mills supplied with ore from the Comstock lode use about twenty tons of this soda per month, at a cost of about $80 per ton.

Salt Deposits in California.—The extensive and valuable *salinas* at the head of the bay, in the vicinity of the Rancho La Punta, are, we learn (says the San Diego *Union*), to be opened and worked in a very short time by a gentleman from the upper part of the State, who has large practical experience in the business. Few of our citizens have an idea of the value of these home salt deposits, which are but ten miles distant from our city. Last year these *salinas* produced over 300 tons of salt; but the gentleman referred to estimates that they are capable of yielding annually ten times that quantity, or 3,000 tons—nearly enough to supply the entire demand of the State. The salt is of excellent quality, being free from alkali—an objection which is made to much of the salt of California. The opening and energetic working of our salt beds, then, is a matter of much importance to San Diego, and it will result in a large and profitable export business. The salt can be easily shipped from the head of the bay in light vessels to steamers or sailing vessels off the town, and at slight cost. Besides, our salt will be subject to no duty, and will pay no export charges, which amount to nearly $5 per ton on all obtained from Lower California and Mexico.

MISCELLANEA.

A Floating Dock for New Zealand.—It is proposed to construct a floating dock at Auchland, (New Zealand,) capable of accommodating the largest ships visiting that port. The gates of this dock will be forty feet wide.

Bridges in the Argentine Republic.—A bridge is being constructed over the Desagaudero, and others have been contracted for, of iron and wood, to be finished within a year, one on the Rio Primero, near Cordova, one on the Carcaranal, in Santa Fé, and one on the Saladella, in Santiago; surveys are also being made for others. Three iron moles are, moreover, being built in the province of Entre Rios, to facilitate access to different ports.

The Floating-dock Bermuda was twice tried during the month of May, and on each occasion successfully. On the 20th it lifted the gun-boat "Britomarte," to which some repairs were needed, and on the 26th her Majesty's ship "Racoon," 22 guns, 1,467 tons, was docked, the operations showing that the workmanship of the dock and caissons is excellent, and that the structure is in the best working order. Ships drawing twenty-one feet can be taken in, and the accommodation the dock will thus afford to the fleet of the North will be very great.

Lighting Boston.—The following items show the cost of lighting the city of Boston for last year: There are seventy-five men employed on the city street lamps. The number of gas-lamps at the present time in the whole city is 4,769, and the number of fluid lamps is 1,244. Last year, 312 gas-lamps were added, and 47 fluid. This great increase in one year was owing to the re-lighting of the Church street district and the widening of many streets. It is reckoned that each lamp burns during the year 3,800 hours, at the rate of one cent per hour for four feet of gas. A person passing along the streets little thinks of the great expense of their illumination; yet, last year, the sum of $276,064.71 was appropriated for this object.

The Iron-founders of Paris continue on strike, and their fellow-workmen in other places not only contribute funds for their assistance, but refuse to execute trade orders sent from Paris. Thus, at Amiens, Toulon, Hamburg, and in Belgium, the workmen have declined to execute work which they regard as belonging properly to their Paris brethren. The men connected with the building trades in Geneva have also struck, in accordance with a recommendation of the association *L'Internationale*, to insist upon a re-arrangement of hours and pay. The masters in the latter town have retaliated, and have formed a league among themselves to resist what they denounce as attempts at domination by a foreign body.

An Illuminated Underground City.—The Virginia City (Nevada) *Enterprise*, referring to the Comstock lode, says: "Day and night, year in and year out, a space under this city equal to the whole superficial area of the town, is constantly illuminated with candles. With the candles that are constantly burning, floor above floor, throughout our mines, we nightly, and all night long, keep the whole city as completely lighted up as on the occasion of a general illumination. The amount of money expended annually in our mines for this one item of light alone must be immense. A single firm in the town—our next-door neighbors, KENNEDY & MALLON—sell annually no less than 20,000 boxes of candles. Other dealers, doubtless, have their share of the trade, yet most of the leading mining companies purchase their candles at wholesale of the manufacturers, or of their agents in California or the East. Our ten or a dozen street lamps would pale into utter insignificance, could all the lights blazing in the underground city suddenly be brought to the surface some cloudy and moonless night."

Fire-Escape.—According to *Engineering*, an exceedingly simple and portable fire-escape, which seems to meet every requirement, has been invented by Major WETHERED, an Englishman. The apparatus consists of a single length of rope, about half an inch in diameter, capable of bearing a breaking strain of from 1,000 to 1,500 pounds. This rope is readily affixed to the upper sash of a window, or to a hook specially provided in the external wall. Being thus suspended at a convenient height above the sill of the window from which it is desired to descend, the running out of the rope is perfectly regulated by passing in a zigzag course through a compound block carrying a self-acting brake, and a lever-handle for releasing it. The person about to lower himself, puts over his shoulder a sack oop, which he hooks on to the brake, and then lets himself out. His weight at once causes the brake to nip the rope, so that he remains securely suspended. A slight pressure on the lever frees the brake, and allows the rope to slide through the block, the degree of speed of descent being thus completely under control. If it be desired to lower other persons, or a family, the block itself can be suspended as an ordinary pulley, the tortuous course of the rope enabling the heaviest person to be lowered most easily. The whole apparatus, with the rope attached, could be put in an ordinary small hand-bag, is in no way liable to get out of order, and in cost will probably not exceed six or seven dollars.

Iron in Pennsylvania.—Our country is so large, that we are apt to forget, sometimes, its whole strength and resources—to overlook some entire sections in the contemplation of others better known. Few are accustomed to think of Western Pennsylvania and Eastern Ohio as a distinctively iron country, so overshadowing are our own coal-ore regions. Yet the figures are on record to show that the Shenango and Mahoning valleys produce over one-sixth of all the iron produced in the United States. At the present time, there are in operation in the two valleys forty blast furnaces, and four others almost completed; also ten rolling-mills and nail-factories, as follows:

BLAST FURNACES.	
Wampum	1
Newcastle and neighborh'd	5
Do. now building,	1
Middlesex	3
Wheatland	4
Sharon	4
Do. now building	1
Sharpsville	4
Do. now building	1
Lowell	1
Struthers	1
Powers	2
Youngstown	5
Brier Hill and Eagle	4
Girard	1
Mineral Ridge	2
Niles	1
Do. now building	1
Warren	1
Hubbard	1
Blast furnaces	44

ROLLING-MILLS AND NAIL-FACTORIES.	
Newcastle	2
Sharon	2
Youngstown	2
Niles	3
Warren	1
	54
Mills	10
Furnaces	44
Furnaces will average each, annually, of	
Ore	12,000 tons.
Coal	20,000 tons.
Limestone	5,000 tons.
Pig-iron	8,000 tons.
	45,000 tons.
	54
	180,000
	250,000
	2,430,000 tons.

MARKET REVIEW.

The Coal Trade.

NEW YORK, August 4, 1870.

WHOLESALE.—Trade has slackened up a little the past few days. Probably buyers are under the impression that Schuylkill, resuming operations, may cause a surplus in the market, and a consequent decline in prices. We have no apprehensions of anything of the kind. Many of the men that have returned to the Schuylkill district have been employed for weeks back in the other regions, and it is merely a transferring of their labor from one section of the coal regions to the other again. This is, or ought to be, the busy season of the coal trade, and the increased supply from Schuylkill would only meet an increased demand, and prevent any advance in prices. This is the point that we argued with our readers last week. We are under the impression that the prices paid for coal for July were about fair, and could be maintained. An advance or decline would be equally ruinous—the one from checking the consumption, and the other from making what business was done unprofitable. We do not apprehend any further trouble in the coal producing districts this year, unless some accidental stoppage may be forced upon us, as from freshets, breaks, etc., which, of course, are liable to happen any time. Trade should, therefore, assume a healthy and steady aspect; and in doing an increased business, we ought to show a fair balance on the profit side. It is extremely satisfactory to us to be able to record the settlement of the difficulties so long existing in the Schuylkill district.

We do not like to see any section of our country impoverished by a dispute between Capital and Labor, and always feel a great relief when a case in point is amicably adjusted. This last strike must have cost Schuylkill county all of $3,000,000—money actually forever lost and irrecoverable. This money has of course come out of the pockets of the miner, the farmer, tradesman, and mechanic, and in fact every individual member of society has a certain percentage of the loss to bear; and what is worse, the loss has been incurred without any apparent advantage gained to either side, and the same "old battle" will have to be refought at some future day.

Our readers are of course familiar with the cause of the strike just ended, and which was inaugurated in March last. The miners desired the basis of 1869 ($3 per ton at Port Carbon,) to hold good for 1870. The operators, finding from the low price of coal that it was impossible to continue paying wages on this basis, except at heavy loss, resolved to stop work. They, however, offered the miners $2 50, which the men indignantly refused, and all "went out." After four months they have finally, through the influence of Mr. GOWEN, the President of the P. & R. R.R. Company, agreed to resume work, providing he will permit a continuation of the drawbacks on coal sent over his line, and which, our readers will remember, he rescinded some two weeks ago, in consequence of the men and operators failing to come to terms.

Mr. GOWEN is a young man of remarkable talent and administrative ability, and we know that no man in Schuylkill county is better able to adjust any difficulties that may arise between men and operators. His long acquaintance with the miners in the district, where he was born and reared, and where he first sowed the seeds of the prosperity he is now reaping, makes him a man eminently fitted as an arbiter, and we hope to see him called upon often for his influence and advice. The following is the circular issued by Mr. GOWEN:

"PHILA. & READING R. R. Co.,
"Office, No. 227 South Fourth street,
"PHILADELPHIA, July 28, 1870.

"On and after Monday, July 25, 1870, the rates of freight and tolls on Anthracite coal, and of drawbacks on coal shipped from Richmond, which were current prior to the advance ordered by Circular No. 7, will be resumed.

"This change is made in anticipation of a general resumption of work in the coal region during the coming week.

"FRANKLIN B. GOWEN, President."

The following circular was also issued on the 23d instant:

"Hereafter, the Philadelphia and Reading Railroad Company will take charge of the shipment of coal on the landings of the Schuylkill Canal. No charge will be made for shipping expenses, and the allowance of five cents per ton, heretofore made by the Schuylkill Navigation Company, will cease. The Pea and Dust will be retained by the Philadelphia and Reading Railroad Company.

"There will be no further shipments from the landings at Port Carbon and Mount Carbon.

"The shipment of coal from the landings will be under the care of Mr. NICHOLS, General Superintendent Transportation Department, and communications relative thereto may be addressed to E. T. WARNER, Shipping Agent, Schuylkill Haven.

"FRANKLIN B. GOWEN, President."

The following are the terms that were offered by the miners and which Mr. GOWEN got the operators to accept:

POTTSVILLE, July 22, 1870.

Resolved, That we the members of the W. B. A., do offer to our employers of Schuylkill county to start on the basis of 1869, when coal is worth $3 per ton in Port Carbon.

Resolved, That when coal brings $3 25, we demand 8½ per cent. of an advance; $3 50—16⅔ per cent. of an advance; $3 75—24⅔ per cent. of an advance; $4—33 per cent. of an advance.

Resolved, That when coal falls below the basis of 1869, say $2 75 we accept a reduction of 8⅓ per cent.; $2 50—16⅔ per cent.; $2 25—24⅔ per cent.; $2—33 per cent. and nothing lower.

Resolved, That any miners working on contract after they start, earning over $100 per month, be reduced 10 per cent.; $125 and over—20 per cent.; $150 and over—30 per cent.; $200 per month, if there be any—40 per cent.

Resolved, That the above figures be taken from the six grades of coal, pea coal not included.

Resolved, That these resolutions be handed to F. B. GOWEN, Esq., President of Reading Railroad Company. JOHN SINEY, President.
GEO. CORBETT, Secretary.

The following is the resolution of acceptance and the subsequent agreement entered into:

And whereas, Mr. GOWEN did, on receipt of said resolutions, give his promise to them to reduce his tolls on Monday following, (*i. e.*, to-day); therefore,

Resolved, That we accept the compromise offered in the above resolutions, and agree to start our collieries.

Resolved, That we hereby declare that the compromise offered in the above resolutions is deemed by us to be an unfair adjustment of the wages question in favor of the men, giving them more than they are justly entitled to, both when coal is at $3 per ton and when it advances above or recedes below that amount.

Resolved, That we are induced to accede to the above compromise at this time, to prevent the attempt of certain parties to run up the price of coal in the Eastern markets, when the real state of the business of the country or the condition of the coal market will not warrant any such advance.

Agreement made at Pottsville, this 29th day of July, 1870, between the Committee of the Anthracite Board of Trade and the Committee of the Workingmen's Benevolent Association.

It is agreed that the W. B. A. shall not sustain any man who is discharged for incompetency, bad workmanship, or bad conduct, or other good cause, and that the operators shall not discharge any man or officer for actions or duties imposed upon him by the W. B. A.

It is further agreed that the spirit and intention of the resolution (called the equalizatiou resolution,) passed by the W. B. A., is that each man shall work regularly, and it is the place of the bosses and operators to see that he does.

The resolution is that the miner earning above expenses, over one hundred dollars and less than one hundred and twenty-five dollars, shall be reduced ten per cent. on the basis. Earning over $125 and under $150 shall be reduced twenty per cent. on the basis. Earning over $150 and under $200 to be reduced thirty per cent. on the basis, and earning over $200 to be reduced forty per cent. on the basis.

To obtain the price of coal monthly, the President of the Anthracite Board of Trade and the President of the W. B. A. of Schuylkill county, shall meet on the 20th day of each month and select five operators, who shall on the 25th inst. following produce a statement sworn or affirmed to, of the prices of coal at Port Carbon, for all sizes above pea coal.

The five operators shall be selected from a list of those shipping over 40,000 tons annually, and none shall be selected a second time, until the list is exhausted.

The prices of coal so obtained shall fix the rates of wages for that month, and this agreement in regard to the mode of obtaining prices, shall remain in force during the year 1870.

WM. KENDRICK,	JOHN SINEY,
J. K. SIGFRIED,	GEORGE CORBETT,
M. P. FOWLER,	GEORGE ATHEY,
SAM'L E. GRISCOM,	JAMES BARRY,
BAIRD SNYDER,	ROBERT WEIGHTMAN.

PRICES—Are firm at our quotations, and we think no change need be expected.

FREIGHTS.—Vessels are in good supply, and freights remain unchanged.

PHILADELPHIA.—From our branch office in Philadelphia, we get the following notes upon the state of the trade in that city: "The market is very active. Orders for coal are coming in very fast—the Eastern dealers wishing to get the benefit of the low rates of freight and the drawback on coal. The demand for vessels is active, and the prices are firmer, and will rule higher next week. Everything promises a good fall business, and the shippers are hoping to make up for the lost time. We think the shippers of this city deserve more than they will probably get—having been idle for four months, and having upheld the operators in their efforts to bring down the price of coal.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending July 30, 1870, compared with week ending July 31, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	12,925	1,828,844	31,762	1,246,781
Schuylkill Canal	38,131	382,519	3,854	64,193
Lehigh Valley R. R.	67,743	1,254,134	61,193	1,827,825
Lehigh & Sus. R. R.	23,014	410,978	15,744	556,274
Lehigh Canal	41,138	314,863	28,510	302,621
Scranton North	543	207,606	21,730	408,644
" South	3,264	609,882	33,819	1,024,670
Penn. Coal Co., rail	8,277	541,847	24,179	650,746
" " canal		9,041	718	10,036
Del. & Hud. Canal Co.	19,200	613,162	33,710	833,369
" " R. R.	400	99,745	8,575	269,598
" " south	85	51,174	10,502	258,415
Shamokin	13,164	200,868	19,620	226,151
Trevorton	1,358	11,081	2,260	45,115
Lykens Valley Coal Co.	2,483	37,716		
Wyoming South	19,413	134,856	8,669	148,205
Wyoming North			5,408	174,579
P. N. Y. C. & R. R. Co.			7,238	164,758
Williamstown, Col'y.	6,723	96,182		
Short Mountain		53,260		
Total	257,911	6,824,768	357,611	8,210,939
1869			257,911	6,824,768
Increase week and year			79,700	1,386,171

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending July 30, 1870, compared with week ending July 31, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	24,000	545,000	16,757	537,597
C. & O. Canal	19,000	306,000	10,674	332,211
H. & B. T. R. R.	8,556	204,324	7,452	179,848
Harrisburg & D.	12,989	....	16,824	450,836
L. V. R. R.	....	552	....	9,380
P. & N.Y. C. & R. Co.	....	....	5,058	139,732
	64,445	1,055,876	56,765	1,649,604

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending July 31, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	31,762 18
Previously this year	1,215,108 01
Total	1,246,870 19
Same time last year	1,828,844 06
Decrease	581,973 07
Amount sent same week 1869	112,925 06

Report of coal transported over the Schuylkill Canal for the week ending Thursday, July 28, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	3,189 00
" Port Clinton	665 00
Total for week	3,854 00
Previously this year	60,339 18
Total	64,193 18
To same time last year	352,519 07

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, July 28, 1870:

From St. Clair	5,136 03
" Port Carbon	2,415 16
" Pottsville	— —
" Schuylkill Haven	14,891 03
" Auburn	1,241 00
" Norristown	— —
" Port Clinton	3,312 08
" Allentown and Alburtis	4,764 02
" Harrisburgh and Dauphin	16,824 04
Total paying freight	48,787 02
Coal for Company's use	4,007 12
Total for week	52,594 14
Previously this year	1,663,220 02
Total	1,715,814 16
To same time last year	2,155,762 03

Amount of Coal transported over the Little Schuylkill Railroad, for the week ending Saturday, July 23, 1870.

Jno. Morgan	64 14	341 08
E. Borda, N. B.	....	33,469 04
E. Borda, O. B	....	463 00
George Ormond	....	493 07
Gideon Whetstone	597 11	8,714 67
James Glenn & Co	25 11	5,405 38
Moss, Abblett	71 12	1,898 40
August Rasbe & Co	....	569 12
Carter, Borda & Co	....	1,194 10
E. Gaujot & Co	....	4,449 16
John W. Krell	56 11	1,097 50
John Whetstone	....	928 18
Bohannan & Laurer	139 14	4,552 48
Evan Cann	....	....
John Randall	....	....
John C. Scott & Son	....	6,969 14
B. L. Eshelman	564 01	16,798 37
Focht, Whitaker & Co	....	12,504 12
George W. Cole	....	10,418 03
Thomas Gorman	1,213 12	16,072 60
Hill & Harris	....	5,537 06
Knickerbocker Anthracite C. C.	....	2,113 04
St Nicholas Coal Co	....	6,261 17
Scott, Walter & Co	....	23,145 12
Suffolk Coal Co	....	2,450 00
W. F. Patterson	....	5,346 00
Lackawanna	....	565 00
Hosie & Longstreet	....	1,217 00
Mahanoy and Broad Mountain	....	40,928 08
Sharp Mountain Coal Co	473 17	9,037 45
Alaska Coal Co	75 09	1,797 50
Peter Bowman	461 16	768 31
Total	3,744 08	224,147 16

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, July 30, 1870.

	WEEK.	SEASON.
North	46,943 05	1,306 554 15
South	10,502 07	258,415 01
Total	57,445 12	1,564,969 16
Corresponding time in 1869.		
North	2,451 04	715,289 06
South	85 07	49 457 04
Total	2,536 11	764,746 10
Increase North	44,492 01	Increase 591,265 09
Increase South	10,417 00	Increase 208,957 17
Total Increase	54,909 01	Increase 800,223 06

Report of Coal Transported over Lehigh Valley Railroad

For the week ending July 30, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	9,759 08	390,815 11	400,575 01
" Hazleton	51,101 00	1,206,816 18	1,257,917 11
" Upper Lehigh	263 18	7,814 08	8,078 06
" Beaver Meadow	19 802 19	432,772 12	452,575 17
" Mahanoy	6,259 08	136,047 13	142,277 00
" Mauch Chunk		447 17	447 17
Total Anthracite	87,176 13	2,174,694 19	2,261,871 12
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		9,380 00	9,380 00
P. & N.Y. C. & R R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	87,176 13	2,184,074 19	2,271,251 12
Same time last year	78,164 14	1,347,370 06	1,435,535 00
Increase		836,704 13	835,716 12
Decrease	988 01		
Forwarded East from M'h Chunk by rail	61,293 10	1,766,531 12	1,827,825 02
Same time last year	67,793 17	1,186,340 12	1,254 134 09
Increase		580,191 00	573,690 13
Decrease	6,500 07		

RECAPITULATION.

Forwarded East from M'h Chunk by rail	61,293 10	1,766,531 12	1,827,825 02
To N. C. R. R., at Mount Carmel	187 19	182 08	370 07
Forwarded North from L. & B. Junction	5,392 19	168,699 16	174,092 15
To L. & S. R. R. at Packerton for rail	201 06	4,672 11	4,873 17
Delivered at M'h Chunk	16 17	753 09	770 06
Delivered on line of road above Mauch Chunk	51 09	7,516 18	7,568 07
Delivered above M. Chunk for use of L. V. R.R.	928 04	33,030 01	33,958 05
To L. & S. R.R., at P'n Hav., for railroad			
Do. for canal	12,835 03	129,202 05	142,037 08
At M. Chunk for canal	6,259 06	64,105 19	70,375 05
Total Anthracite	87,176 13	2,174,694 19	2,261,871 12
Bituminous Coal		9,380 00	9,380 00
Total all kinds	87,176 13	2,184,074 19	2,271,251 12

The following is the amount of Coal shipped over the Hazleton Division of Lehigh Valley Railroad, for the week ending July 23, 1870.

COLLIERIES.	WEEK.	TOTAL.
Hazleton	9,954 02	228,246 01
East Sugarloaf	7,175 12	154,345 00
Council Ridge	3,826 06	90,510 02
Mount Pleasant	841 02	24,501 09
Harleigh	1,785 19	82,603 19
Jeddo	5,886 02	134,620 05
Ebervale	4,733 09	115,950 13
Milnesville	1,803 00	45,542 12
Buck Mountain	3,081 19	44,878 13
Cross Creek	2,664 09	42,878 13
Ashburton	.....	1,290 12
Highland	2,464 13	40,090 11
Lattimer	2,439 01	58,393 07
Woodside	702 13	16,564 13
	47,388 07	1,050,416 16
SAME TIME LAST YEAR.		
Rail and Canal	12,650 13	691,974 05

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending July 28, 1870:

	Tons.
For week	16,824 04
Previously this year	434,012 03
Total	450 836 07
Same week last year	12,989 03

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending July 30, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5,408 09	169,130 18	174,538 07
Bituminous	5,058 00	134,674 00	139,732 00
Total, Ant. and Bit.	10,466 09	303,804 18	314,271 07

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals.

Week ending July 30, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	29686 16	24364 11	687817 18	684048 10
Upper Lehigh Region	3970 17	4011 03	79034 01	69723 19
Mahanoy Region			362 16	1433 13
Hazleton Region	13624 17	11888 01	147595 11	85150 14
Beaver Meadow Region	6355 11	7480 19	70466 02	48934 09
Mauch Chunk Region	341 09	16707 04	31440 05	17390 12
Totals	50379 10	64814 14	997149 11	763271 17
Increase	14435 04		233877 14	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	15764 11	23014 10	556274 13	410978 09
Forwarded East of Mch Chunk by Canal	25510 06	41138 16	301621 07	314863 12
Delivered at and above Mauch Chunk	750 09	661 08	23634 09	18790 07
Delivered to L. & B. R. R. at Plymouth Bridge	5354 11		115619 02	13688 06
L. V. R. R. at Sugar N.				5151 03
Totals	50379 10	64814 14	997149 11	763271 17
Of the above there was transported on acc'nt of L. C. & N. Co.	341 09	17988 13	48094 02	191501 11
W.-B. C. & I. Co.	12922 10	13406 00	299902 15	204175 02
Totals	13263 19	31394 13	347996 10	395676 13
Increase	18130 14		47680 03	
Decrease				

Shipments of Cumberland Coal

for the week ending Saturday, July 30, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	.....	.....	.....
Borden	1,330 12	2,2 7 13	3,558 05
Consolidation	2,245 05	2,665 13	4,908 18
Spruce Hill	611 08	.....	611 08
Midlothian	1,096 06	.....	1 096 06
H. and Baltimore	....	1,438 07	1,438 07
do Va M	569 16	.....	569 16
V C & I Co	374 07	.....	374 07
G. C. C. and I	1,151 13	.....	1,151 13
Maryland	166 09	.....	166 09
American	.....	4,343 03	4,343 03
Atlantic	1,274 18	.....	1,274 18
Piedmont	580 00	.....	580 00
Swanton	1,279 05	.....	1,279 05
Barton	898 00	.....	898 00
Potomac	1,367 00	.....	1,367 00
Franklin	1,933 12	.....	1,933 12
Big Vein	1,881 08	.....	1,881 08
Total week	16,757 19	10 674 16	27 432 15
Previous	520,839 18	321,536 13	842,376 11
Total year	537,597 17	332,211 09	869,809 06

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, July 30, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	9 499 02		23,366 03		23,366 03	
1869	18,922 02		24,079 01		43,001 03	
Increase						
Decrease	9,423 00		10 212 00		19,635 00	

YEAR.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	283,430 06		475,345 06		758,775 12	
1869	306,058 06		545,928 06		851 986 12	
Increase						
Decrease	22,628 00		70,583 00		93,211 00	

Statement of coal transported over the Eckhart Branch Railroad, during the week ending Saturday, July 30, 1870, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	1,175 14		1,946 15		3,122 09	
1869	1,864 10		4,029 03		5,893 13	
Increase						
Decrease	688 16		2,082 08		2,771 04	

YEAR.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	53,364 12		57,388 03		110,752 15	
1869	37,222 17		57,218 07		94,441 04	
Increase	16,141 15		169 16		16,311 11	
Decrease						

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, August 4. R. A.	AT NEW YORK, August 4. W. A.	AT PHILADELPHIA, August 5. R. A	AT PHILADELPHIA, August 5. W. A.
Lump	$— —	$5 00	5 00	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 25	— —	4 50 to — —
Egg	5 75 to 6 25	5 25	— —	4 75 to — —
Stove	— —to— —	5 75	— —	4 75 to — —
Chestnut	4 50 to 5 40	4 75	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	6 00	— —	— —	— —
Broken	5 75	— —	— —	— —
Egg	5 60	— —	— —	— —
Stove	6 00	— —	— —	— —
Chestnut	5 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	— —	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	— —	— —	— —
Honey Brook, Leh'h	W. A.	5 25 to 6 00	— —	— —
Spring Mountain	" "	5 25 to 6 00	— —	— —
Sugar Creek	" "	5 25 to 6 00	— —	— —
Sugar Loaf	" "	5 25 to 6 00	— —	— —
Old Comp'y's.	" "	5 25 to 6 00	— —	— —
Cross Creek	" "	25 to 6 00	— —	— —
Enterprise	" "		— —	— —
Girardville	" "		— —	4 75
McMichael	" "		— —	4 75
Shamokin	" "	5 50	5 25	— —
Lykens Valley	" "		5 25	— —
Broad Top	" "	5 50	— —	— —
Hill & Harris	" "		4 75	— —
Henry Clay	" "	5 00	— —	— —
Powelton	" "	5 50	5 00	— —

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

	F. L.	Bro.	Gra.	Ex.	Sto.	Cst.
Lehigh	$3 00	$3 50	$3 50	$3 50	$3 75	$3 00
Wilkesbarre	3 00	3 50	3 50	3 50	3 75	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein f.o.b. at Phila..$5 00
Lemon " " " .. 4 75
Cumberland Vein Coal..... " " .. 5 00
Cumberland C. & I. Co.'s on board..... N. Y.... 7 00
Maryland Coal Co. " " .. 7 00
Consolidated Coal Co.'s " " .. 7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port...						
Pittston at Newburgh	4 30	4 50	4 50	4 60	5 10	4 20
Lackawana at Rondout	4 60	4 70	4 80	5 00	5 25	4 60
*Wilk'b're at Hoboken	4 65	4 75	5 25	5 25	5 75	4 80
Old Co. Lehigh at Pt. Johnston.....	— —	— —	— —	— —	— —	— —
Lehigh at E. Port.....	5 75	5 50	5 50	5 50	5 75	5 00

For freights to different points, see "Freights."
* 25c. advance alongside.

Prices at Baltimore—August, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load.....$5 30@5 50
Pittston and Plymouth, do..... 5 00@5 25
Shamokin Red or White Ash, do..... 5 50@5 75
Lykens Valley Red Ash, do..... 5 40@5 50
Zerba Valley..... 25 5@— —
By retail, all kinds per ton of 2240 lbs..... 7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes..... 4 75@5 00
Fairmont and Clarksburg gas, f. o. b. at L. Point 5 35@5 50

Prices at Georget'n, D.C., & Alexandria, Va.

August, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes ..$— —@— —
Lykens Valley .. .. — —@— —
Shamokin Red or White Ash.. .. .. — —@— —
Trevorton and Zerba Valley .. .. — —@— —

Prices of Gas Coals.

August, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y.
Duty, $1 25, gold.

	Coarse.	Slack.
Block House.....	$1 75	@- 75
Gowrie.....	1 75	@- 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou.....	$2 25	@1 25
Sydney.....	2 25	@- 80
Lingan.....	1 75	@- 80
Little Glace Bay.....	1 75	@1 00
Caledonia.....	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack Currency.
Fairmount Gas Coal Co. of N. Y.....	7 50	@— —
Despard Coal Co.....	$7 50	@— —
Penn.....	— —	@— —
Newburg Orrel Gas.....	— —	@— —
West Fairmount Gas Coal.....	8 00	@— —

AT PHILADELPHIA.

Powelton.....$7 80

Prices of Foreign Coals.

August, 1870.

Duty $1 25 per ton.
Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking .. ..

The Rival Breech-Loaders.

THE ZUENDNADELGEWEHR AND THE CHASSEPOT—WAR IN THE WORKSHOP.

VIRGIL was right in supposing that some place was due to "arms" in his famous ballad. "Arms and the man," he sang; but had he known what an arm of precision was, or could he have hoped to use *zuendnadelgewehr* in a hexameter, the praises of Æneas would have been sounded less, and dactylic measures would have indicated the rapidity of the Chassepot—the Chassepot which "did wonders at Mentana." Some attention is due, in the study of modern warfare, to these weapons, seeing that it is on their use and their merit that victory may depend.

Providence, that was on the side of the heaviest battalions in the days of the first NAPOLEON, is on that of the arm of precision and rapidity in those of FREDERICK WILLIAM and the third BONAPARTE. This was the story and the moral of the late Prusso-Austrian war It was taught and read on the field of Sadowa, and Custozza had been a Sadowa, if the Italians had the Prussian weapon. It was the story of the Italian war, where rifled cannon mowed down the Austrian white-coats. It was the moral of Mentana, where Garibaldians afforded a satisfactory target and a rational test for the French Chassepot. It was a knowledge of the superiority of the Prussian weapon that kept France back when the black eagle swooped down and carried crowns to its eyrie, and tore the title deeds of Central Europe into shreds. This is a scientific and hardly a muscular age, and the providence of the Little Corporal's conceit is today a scientific providence which despises a Croat and a Cossack, and has a mighty reverence for a Snider or a Chassepot.

If this new war does not produce some other weapon hitherto known only to those accustomed to manipulate it in secret practice, the Chassepot and the Prussian breech-loader will be fairly tried against each other. But there are already suspicions or rumors that each foe brings into the fight new weapons which will complicate the test. There is the French *mitrailleuse*, it said, which can rain bullets like hail; there is also the Prussian *kugelhitzen*. Whether hail or conical shot will carry the day it is impossible to say; but it is noticeable that the war of the nineteenth century is transferred to the artisan's shop, and that diplomacy and "tented fields" are but agencies and instruments wherewith is obtained a trial of the inventive genius of bellicose nations.

THE NEEDLE GUN.

The Prussian needle-gun is the invention of Mr. DREYSE, a manufacturer of arms, who spent over thirty years in trying to construct a perfect breech-loading rifle. The cartridge is inserted at the rear, and the ignition is produced by the intrusion of a needle into the fulminate attached to the cartridge. The barrel is 36.06 inches long, and is rifled with four grooves down to the breech, where the chamber or bed for the cartridge, is smooth, and a little larger than the bore. The bed enlarges slightly to the rear so as to admit the cartridge freely, and the lower part of the bore for a distance of 6.17 inches, is enlarged, so that the ball is gradually compressed into the grooves. The rear of the barrel is conical, and is called the mouth-piece. Over this part there is a six-sided cylinder, which holds all the mechanism of the piece. The air-chamber, next to the cylinder, has the needle-pipe screwed into its breech.

At the time of the adoption of this new gun the cartridge was altered, the sabot being enlarged, and placed between the powder and the ball. The ball is sphero-conical. The charge of powder is 56 grains. The weight of the Prussian needle-gun is 10.27 pounds to 11.3 pounds. The mechanism can be taken apart without screw-driver, vise, etc. It can be safely and easily cleaned, and the gun being small, is particularly adapted for use in the contracted space of loop-holes, on horseback, etc. The objections to the Prussian needle-gun are the danger of a weakening of the spiral spring, and the possibility that the needle may not be propelled with sufficient force to pierce the cartridge. On account of the ease and rapidity with which it is loaded, there is also danger of a waste of ammunition, as the soldier, in the heat of battle, will often fire his piece as fast as possible, even when he knows the firing has no effect. To make the best use of the needle-gun the soldier requires special training. The Prussian army is very well trained to its use, and in this respect has an advantage over the French, who have never gone into a great battle with their Chassepot.

THE CHASSEPOT.

The fire-arm which has been adopted by the French army is the celebrated Chassepot rifle, which is probably the most efficient weapon ever put into the hands of an army of infantry. It resembles the Prussian needle-gun, but possesses several improvements. During the late war between Prussia and Austria the effective work of the newly invented needle-gun attracted the notice of all fighting nations; and the French, anticipating that they would some time be called upon to punish Prussia for her alleged arrogance and want of honor, immediately set to work to invent a weapon that should surpass the needle-gun in its power as an engine of war. The result was the invention of M. CHASSEPOT, after long and careful study, having the Prussian gun to aid him and to improve upon. After the new rifle had been tested over and over again, the attention of the Emperor was invited to it, and it was not long before he was convinced of its superiority, and ordered its adoption in the army.

One of the principal improvements which the Chassepot has over the needle-gun of Prussia, is that its movement is simpler, and instead of being tightly enclosed in the breech by a cylinder, it is almost fully exposed, and the employment of India-rubber as an obturator. It is argued that the Prussian gun, after it has been discharged several times in quick succession, becomes hot and damp in the chamber, owing to the inability of the gas, which comes back after the explosion of the cartridge, to escape. The inside soon becomes dirty, and the soldier is required to take his piece apart and clean it. The French gun is always open, and while there is no gas shut up in a chamber to corrode the metal, it can in a moment be cleansed from dirt or rust, and the soldier is always able to quickly discover any accident to his rifle. It is claimed that this gun is not so easily clogged as the Prussian needle-gun, and is more substantially built.

The Chassepot is handled in the following manner: While loading, hold the gun in the left hand with the but-end resting on the left hip. The lever is then turned with but one movement, from right to left, and with another pulled back, after which the cartridge is inserted into the opening thus effected. By a third movement—pushing back the lever into its original position—the gun becomes ready to be fired off. The projectile is a rather long slug with the end rounded and pointed like our rifle ball. The charge, which is attached to it in a paper covering, is composed of a peculiar powder, specially manufactured for the purpose. The distance at which this gun carries with certainty is very considerable—over 1000 metres. Both the infantry and the chasseurs have only the one model, but the bayonets differ, in so far as those of the chasseurs are sword bayonets.—*Iron Age.*

Oxygen Gas in Furnaces.—A Substitute for the Air Blast.

J. C. CAMERON, Esq., an old resident of Marquette county, Michigan, writes to the *Mining Journal* on the subject of introducing oxygen gas as a substitute for the air blast in furnaces, and as he proposes something new in the economy of blast furnaces, we give the most important points of his letter:

In the progress and development of science there is no branch of human industry so marked for extension in the future of the world's history as the manufacture of iron. For the production of pig or crude iron three materials are required, iron ore, coal, coke, charcoal or peat, as fuel, and limestone, or some suitable substance, as flux. And upon the economical combination of these substances and the improved forms of furnaces, depends the quality and profit derived from the manufacture; but in this branch of industry, so extensive and important to the human race, waste, the great destroyer of man's fabrics, thrusts in its ruthless hand to curtail some profit or enjoyment of the product of skill. And in order to overcome this, new discoveries of the most profound character are being thrown upon the world, and made necessities of the day, so that few have stopped to inquire by whom, when, or where they were made objects of commerce indispensable to the progress of the human race.

It is assumed, and the assumption has not been overthrown, that one-half to three-fourths of the present consumption of fuel is wasted in the production of crude iron in blast furnaces of our present forms and modes of metallurgical operations; and from this assumption the inquiry becomes inseparably connected with the interior forms of the furnace, and the combined efforts of a heated blast on the economy of fuel. For a number of years many improvements in the interior forms of furnaces have been effected. Their adoption has, however, been followed by no marked economy of fuel. The introduction of the hot-blast by NELSON, being the most marked improvement, has never been followed by the results claimed for it, which may involve an assumption on my part, which, however, is very strongly sustained by the late WM. TRURAN, C. E. Writing on the subject he says:

"Unsatisfactory is the explanation that a hot blast is better fitted for supporting combustion than the cold; but before we can allow this assumed superiority, we must know in what respect the composition of the hot differs from the cold blast. If hot air supports combustion better than cold, the relative proportions of oxygen and hydrogen composing atmospheric air must alter with the accession of caloric, or else the cold air contains some deleterious ingredient, which is got rid of by heating. But the relative proportions of these gases are not altered, and whatever substance may be mingled with cold air exists to the same extent in the heated blast. The expanded volume of the heated air is supposed to be more favorable to perfect combustion in consequence of the enlarged surface presented by the atoms of oxygen for combining with the carbon. This involves the supposition that the atoms of oxygen are themselves expanded by heat. From what is here advanced it is evident that the quantity of atmospheric air at present thrown into the blast furnace is inadequate to the complete combustion of the fuel, and that under the most favorable circumstances there occurs with the cold blast only a loss or waste of fuel, equal to one-fourth of the entire consumption, beyond that occurring with the heated blast, and as the volume of air delivered into the hot-blast furnace is manifestly incapable of yielding more than nine-sixteenths of the oxygen necessary for the combustion of the coal charged, we learn that of the coal consumed by the furnace, considerably less than one-half contributes to the reduction of ore and flux."

The above facts may be disputed, but cannot be disproved. This excessive waste of fuel used in blast furnaces for the production of crude iron, has engaged the attention of many leading minds, and the ingenuity of not a few, in endeavors to solve it, and in devising modes and appliances to remedy this defect.

Prominent among the devices proposed is the introduction of oxygen gas as a substitute in part for the air blast now in use in blast furnaces. The importance of oxygen gas is well understood by scientific men, and its cheap production and application to metallurgical operations is so far admitted by scientific men to be a valuable improvement in the manufacture of crude iron. We have, therefore, made application to the United States for letters patent therefor, and look forward to its general application to blast furnaces and general metallurgical operations.

Almost instantaneously with our own investigations for the cheap production of oxygen gas, Mons. Tessie du Motay, of France, made the announcement of having accomplished the long desired result, and has introduced it to the world as an illuminating agent, said to be seven times greater than that produced by an equal amount of street gas. In recognition of the importance of this discovery, the Emperor NAPOLEON bestowed upon the inventor the Cross of the Legion of Honor, and other tokens of favor. Its universal appetency is so well understood and acknowledged that the discovery of a cheap method of obtaining it will rank as one of the most brilliant revelations of the age, and will confer invaluable benefits upon the civilized world.

An English Apparatus for Preventing Disastrous Explosions in Coal Mines.

An account of a new invention for accomplishing the desirable object of rendering the danger from fire-damp less than it is at present, we take from our able cotemporary, the *Colliery Guardian:*

"The invention for which letters patent have been granted to Mr. PETER WALKER, of Bewsey New Hall, near Warrington, a brewer, and which bears the title, 'Improved Methods of and Apparatus for rendering Coal Mines less injurious to those employed therein,' relates, of course, more particularly to those coal mines ordinarily known as fiery mines, that is to say, to those mines, the atmosphere of which, by reason of the admixture with them of inflammable gas or gases (for example, carburetted hydrogen), is capable of being set on fire or exploded, or is at times liable to be fired or exploded by means of the lights used by the workers in them, or by other means.

It will not be necessary for us to inform our readers that, in order to guard against the occurrence of these explosions, it has been customary to employ in such mines safety lamps; but that, in cases where the ordinary ventilation of the workings is insufficient to prevent the accumulation of gas or gases in the workings or in other parts of the mine, the employment of the safety lamp tends to permit of this accumulation; and that it may be said necessarily to follow, on the occurrence of an explosion, the loss of life and damage to property are greater than if such lamp had not been used. Now, the object of this invention is to prevent the gas or gases from accumulating to the same extent as at present, and this the inventor seeks to effect by setting fire to or exploding the gas or gases, or admixture of atmospheric air and gas or gases, at frequent intervals, and at such times as there may be no human beings in the mine. For this purpose it is preferred to employ a current or currents of electricity, magnetism, or galvanism, which is or are conveyed into the interior of the mine by means of conducting wires. In various parts of the workings, and other parts of the mine, in which gas or gases have been found to accumulate, the contact of the conducting wire or wires is caused to be broken, so that when a sufficient strong current (for example, of galvanism,) is passed through the wire or wires heat shall be generated sufficient to fire or explode the air contained in these parts of the mine, supposing the air to be capable of being fired or exploded; or the heat is employed to effect the firing or discharge of a cartridge or of cartridges containing gunpowder, or other explosive material or compound, or the current is caused to ignite any suitable combustible material or preparation, so as to produce a flame sufficient to fire or explode the air as aforesaid. Mr. WALKER prefers to discharge the galvanic current or currents through the conducting wires at frequent intervals, as, for example, the discharge may in some cases be effected each morning before the descent of the operatives, and as the accumulation of large quantities of gas or gases will, by these means, be to a great extent prevented, the explosions, when such occur, will be slight as compared with those which might otherwise have taken place. Other means for firing or exploding the air or mixture of gases than the current or currents may be employed, as, for example, apparatuses may be placed in suitable positions in the mine, such apparatuses being so constructed as to be capable of being wound up or set so as that after an interval of time sufficient to enable the person or persons winding up, setting, or placing them to reach a place of safety they shall fire or explode a cartridge, or shall set fire to a suitable combustible material or preparation, or shall otherwise generate heat sufficiently intense to fire or explode the mixture of gases. In lieu of winding up or setting the apparatuses, a a current or currents of galvanism or other similar fluid may be employed to cause them to act as aforesaid, or a wire, cord, or other equivalent may be led from the apparatuses, or from each of them, and be continued until a place of safety is reached, from whence they may be caused to act by pulling the wire or cord. Various other means may also be employed as may be desired, so long as the principle of the invention is retained, namely, the intentional firing or exploding of the gas or gases, or mixture of air and gas or gases, at such times and for the purposes mentioned above. No. of specification, 3091 (1869)."—*Colliery Guardian.*

So-called Cold Galvanization of Iron and Cast-Iron.

According to V. ROQUE, the iron is first cleansed by being placed in a bath made up of—water, 1,000 litres; chlorhydric acid, 550 litres; sulphuric acid, 50 litres; glycerine, 20 litres. On being removed from this bath the metal is placed in a bath containing ten per cent. of carbonate of potassa, and is next transferred to a metallizing bath consisting of—water, 1,000 litres; chloride of tin, 5 kilos.; chloride of zinc, 4 kilos.; bitartrate of potassa, 8 kilos.; acid sulphate of alumina, 4 kilos.; chloride of aluminium, 10 kilos. The metal has to be left in this mixture for from three to twelve hours, according to the thickness of the layer of zinc desired.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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Mining and Geological Explorations.

PROFESSOR F. V. HAYDEN is reported to be in camp at Cheyenne, with his party, preparing for the exploration of Wyoming Territory, in spite of the hostile Indians. We hope the party will have no occasion to employ the means of defense with which it is said to be well provided.

The delay of Congress in passing the appropriation bills has set back all the field-work of this character, depending upon the support of government. Mr. A. EILERS, an assistant of the U. S. Commissioner of Mining, has but just started for Arizona and New Mexico. In this instance, the lateness of the season will be favorable, as the best period for travelling in Arizona will be from October onward. We are glad that Arizona is to receive the official attention of the Commissioner this year. It has been unavoidably neglected hitherto; but its great, though comparatively unexplored, mineral resources demand examination; and doubtless it is in this direction that we may look for new and valuable discoveries hereafter. Moreover, Mr. MCCORMICK, the delegate from Arizona to Congress, has earned for his territory the right to such official attention, by his persevering, earnest, and eloquent efforts to interest Congress and the Government in the work of geological explorations and statistical reports throughout our vast metalliferous public domain. To him, as much as to any one man, is due the renewed appropriation by Congress for the collection of statistics of mines and mining. It is true, the sum is smaller than it ought to be; but it would have been smaller—that is to say, nothing at all—but for the spirited course of a few wide-awake men like JOHNSON of California, CHAVEZ of New Mexico, and MCCORMICK of Arizona.

The Commissioner himself is detained for a few days longer in revising the last sheets of his report of last year, the publication of which has been subject to annoying delays, arising from the great amount of other public printing during the session of Congress. Advantage has been taken of this vexatious loss of time, to enrich the volume with some excellent illustrations of machinery, etc., which will add much to its interest and value. It is Mr. RAYMOND's intention, as soon as this work is finished, to start for as long a journey as the season will permit. Possibly he will be unable to visit any other territory than Montana. We trust the citizens will welcome and assist him this year as cordially as they abused him last year for not coming.

Dimorphism of Carbonate of Lime.

DR. HERMANN CREDNER, who spent several years in this country, and returned to Europe some time since to accept the Professorship of Geology in the Leipsic University, has recently published the result of some of his experiments, undertaken with a view of determining if possible the cause of the different crystalization of calcite and aragonite. The results which he publishes are of the greatest interest to the mineralogist and physicist. STROMEYER years ago advanced the idea that the strontia contained in most specimens of aragonite might cause the carbonate of lime to crystalize in that form. BECQUEREL observed that the presence of gypsum also, under certain circumstonces, caused the formation of aragonite crystals, but GUSTAVE ROSE's researches seemed to show that the different crystal system, as well as the appearance of different faces in specimens of the same crystal form, was chiefly due to the variable temperature of the solution from which the crystals were formed. By study of the associations in many localities of this mineral, calcite, so extraordinarily rich in crystal forms and faces, Dr. H. CREDNER has been led to the conviction that accessory constituents of the original solution must have modified the habitus of the resulting crystals.

Being convinced by these observations that the clue for the discovery of the cause of the dimorphic crystalization of carbonate of lime was given by the small amounts of strontia, which was found in the majority of the aragonite specimens, of carbonate of lead, which was found in a considerable number, as well as by the frequent occurrence of aragonite in connection with sulphur and gypsum, experiments were undertaken on a much larger scale.

These later experiments showed that a pure, cold solution of carbonate of lime gave only crystals of calcite, in the form of the first rhombohedron. After the addition of a small amount of the silicates of soda or potash the resulting crystals showed the general form of the primary rhombohedron, with only slight modifications, the edges being sometimes replaced. Sulphuretted hydrogen water, with a trace of nitrate of lead, gave crystals of calcite which showed scalenohedrons and at the same spear-shaped crystals of aragonite. The addition of a small amount of a weak solution of carbonate of lead gave the same result. A slight addition of gypsum water to the cold solution of the bicarbonate of lime produced single crystals of calcite, together with tufts of spear and needle-shaped crystals of aragonite. When, by means of a string, a very dilute solution of bi-carbonate of strontia is added to the cold solution of bi-carbonate of lime, crystals of calcite are formed in connection with those of aragonite similar to those previously described. Finally, the direct addition of bi-carbonate of strontia induced the formation of wedge-shaped crystals of aragonite alone, in groups, showing the faces of the prism and pyramid.

From these experiments the author deduces the following conclusions: First. The addition of certain substances to a mineral solution, influence the crystalization and the number of faces of the resulting mineral. Secondly. By certain additions to its solution, a mineral substance can be made to produce crystals of an entirely different mineral species. Thirdly. Carbonate of lime which crystallizes as calcite from a pure cold solution of bicarbonate of lime, will in consequence of an addition of a small amount of carbonate of lead, sulphate of lime or carbonate of strontia take, at least partially the form and properties of aragonite. Fourthly. The difference of the temperature of the solution is not the sole cause of the dimorphism of carbonate of lime.

The Fleet of the Future.

UNDER this heading Mr. J. SCOTT RUSSELL discourses in the London *Mechanic's Magazine* of the revolution which has been or is about to be effected in the commerce of the world and in the apparatus of maritime war. The last time we took Mr. RUSSELL in hand, was when he spread himself in a long speech, explaining how he contrived to cross railway trains over a Swiss lake, by running the trains upon ferryboats; how ingeniously he made the boats alike at both ends, and caused the wheels to run upon separate shafts, so that the vessel could be turned in little space; and how he trained the brakesmen not to run the cars across the boats into the water, by chalking a line on the deck where the cars were to be stopped. The glory of these performances was somewhat eclipsed by the fact that every device of Mr. RUSSELL's not positively ridiculous, had been for long years in actual daily use in the United States, while only those expedients which were silly bore the stamp of originality.

Mr. RUSSELL, having on that occasion, omitted to give us credit for what we had done in America, now squares the account by giving us credit for what we are not going to do.

The Isthmus canal, he says, will be done in ten years. He has a plan of it before him, (lucky fellow; why don't our government borrow it, instead of bothering with exploring parties?) "It is to be made through the narrow part of the Isthmus of Darien, with a beautiful harbor at each end which nature has given. It is the same length as the canal through the Isthmus of Suez, 100 English miles; but there is this difference, that half of it is already made by nature."

Nature having subscribed both harbors and half the construction expenses, it is a great pity that Captain SELFRIDGE couldn't find the locality of her signature, made "in the presence of" SCOTT RUSSELL. We fear that what Mr. R. saw was only the prospectus of the Canal Company, which is a very different thing from the list of stockholders, with Nature at their head.

There is too much of this dogmatic ignorance in the article to which we refer; but it nevertheless contains some very interesting speculations. Give Mr. RUSSELL all the premises he chooses to assume, and he will reason you out a brilliant lot of conclusions. The argument of his essay is somewhat as follows:

I. The voyage of the future will be round the world, via the Suez Canal.

II. The ship of the future must be an iron steamer of 3,000 tons nominal, carrying 6,000 tons of merchandize. This vessel will easily go through the Suez canal; Mr. LESSEPS says so. And she will make money at the business; Mr. RUSSELL says so.

III. The war ship to protect this merchant vessel must be of 5,000 to 7,000 tons nominal; it must go certainly 15 knots an hour; and it must be much more manageable and quick than those now afloat. The naval tactics of the future will consist of running down your enemy, it you are the heavier, or running away from him, if he is the heavier. Hence the shooting part is of minor consequence; at least it is not necessary to protect the batteries of guns.

"Consider," says Mr. RUSSELL, "what a naval engagement must be, between two such ships.

"I see my enemy coming towards me; I either run away, or I do not, or I go forward; if I run away the less that is said about that the better; if I lie still there will be nothing to say, therefore I go to meet my enemy. When we meet, what is the great point between us? Which shall give the other the stem. It is not a question of how many shots I shall fire out of a round turret. When we get close to one another one of us succeeds in running into the other; if not, we both sheer off, and then is the time, and only a moment, when the guns are wanted—not one, two, or three guns, fired at a long range, but a broadside of the greatest number of guns you can have ready loaded to discharge as you turn. What you want is a broadside of the largest guns you can place on board the ship, thoroughly unprotected, with competent gunners, who, I may say, do not care two straws for the protection you are offering them. That broadside must be discharged in a moment, and the larger mass of shot you can, at that critical instant, pour into your enemy, the better. Then you go away, turn round, and come back again. That is the mode in which a battle must now be fought out. Am I wrong in saying that such a battle requires a totally different weapon from any that we have hitherto had?"

IV. Ships to attack land batteries must, of course, be armor plated, as at present. It is for convoying merchant fleets that the large swift steamers, above described, are recommended.

It seems to us quite likely that before Mr. RUSSELL's revolution can be accomplished, new discoveries in ship building and in warfare will forestall it.

New Publications.

THE PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. EIGHTEENTH MEETING HELD AT SALEM, MASS., AUGUST, 1869. Cambridge: Published by JOSEPH LOVERING, 1870—forms a handsome volume of over three hundred pages, giving full reports of interesting papers read before the Association at their last meeting. In the beginning are given the lists of officers, committees, and members of the Association, together with the constitution and resolutions of a permanent and prospective character. These are followed by the address of ex-president B. A. GOULD "on the position of the scientific investigator in the community; on the duties incumbent upon him, and what he may rightfully expect in return; on the obstacles which beset his path, and on the results which he may be justified in anticipating as the reward of patient, unfaltering, and conscientious effort in his high vocation."

The subject is treated in an able and eloquent style, showing that the speaker felt not only an interest but a love for it. The advance of science is compared to the operations of an army against a fortress. The trenches advance slowly from left to right with sure and measured tread, and gradually the circumvallations close around the citadel. "Here ground is gained for a new base of operations; there, is opportunity for striking in a new direction. Through avenues thus prepared the embattled host advances. At last a point is secured whence the artillery may begin its work. Under cover of this, new approaches are effected, until at last, in the fullness of time, the final charge is made. One brilliant dash, and the stronghold falls. But should the engineer's devices, the miners' toils, the soldiers' labor at the earthworks, and the artillerists' service at the guns, all be held cheap, because of our admiration of the gallantry and chivalry that led the decisive onset?" The simile is too apparent to need explanation; every one can see at a glance the object aimed at by the speaker in the last sentence. Brilliant discoveries are only the result of patient and unremitting toil on the part of somebody, often a different person from the discoverer.

In defending the men of science from the charge of one-sidedness, which is sometimes brought against them, the speaker remarks, very truly, that as a class scientists are much better acquainted with literature, philosophy, and the arts, than the followers of these vocations are with science. Finally, the relation existing between theology and the natural sciences is considered, and some extracts from President BARNARD's address of the previous year are commented on. The address we can conscientiously recommend to the perusal of those who take an interest in subjects as abstract as those here treated.

The communications are classified as follows: Mathematics, Mechanics, Astronomy, Electricity, Chemistry, Geology, and Palaeontology, Zoology, Botony, and Ethnology. Many of these are of great interest, and worthy of special attention from the tacit endorsement given by the Association in ordering

them to be printed. "The laws of the deflection of beams, exposed to a transverse strain," by W. A. NORTON, showing that some of the hitherto received laws upon the subject are disproved by experiment, will appear shortly in our columns. The communication by Dr. JAMES P. KIMBALL, of New York, on the Cretaceous Age of silver deposits of Chihuahua, Mexico, will be found very able and doubtless accurate. "The plasticity of pebbles and rocks," by WILLIAM P. BLAKE, of San Francisco, Cal., is carefully prepared, and treats, with the author's usual ability, of a subject which has recently attracted some attention in scientific circles.

The London Underground Railway.

WE take from the *Iron Age* the following description of this great work. New York is so much in need of some more rapid and easy mode of transit, that perhaps some reader may obtain ideas from the perusal of this article which will lead to more improved facilities for our city, while, at all events, the subject is an interesting one.

There is something very attractive—one might say poetic—in the resulting operations and effects of science, even to those to whom science itself is a name for wearisome and unmitigated dryness. And, as illustrating these operations and effects, statistics themselves become glowing, and give food to the imagination as to the reason. Railways and railway-building are dryish topics; proper, it would seem, only to engineers and contractors on the one hand, and to legislators, directors, and shareholders on the other; but something may be picked out of them, sufficient to amuse the unscientific world. "Mugby Junction" was followed by a perfect shower of pithy stories about railways and railway travelling.

But the London underground railway is one of exceptional interest. It is one of the marvels of the age—a vivid illustration, not only of human and scientific capabilities, but especially of that English dogged persistency, sturdy perseverance, ignorance of defeat, energy in reaching an end after starting for it, which beat the French at Poictiers and Agincourt, established the empire on which the sun does not set, and gave us steam-engines. Engineers, with their armies or navies, have been for these past seven years burrowing underneath this vast city, in this direction and in that, in circles, diagonals, and right angles, under houses and churches, and alleys and parks, through London clay and Roman ruins, and Saxon bricks, from the Squalordom of the far east to the gorgeous Mammondom of the far west, and from the banks of the Thames to Highgate retreats, and the cozy nests of St. John's Wood; emerging here and there for a moment into the full light of day, then plunging again into blank, wet darkness; tunnelling, bracing, walling up, arching over, underpinning house-blocks, building buttresses, ranging "streets" and roofing with "cast-iron girders," erecting "transverse jack-arches," and fitting "trussed purlins;" laying their rails and building stations, running up ventilation shafts, and finally setting the railway trains agoing therein to the number of some twelve hundred a day, one arriving every three minutes at each station, and about one hundred thousand passengers being conveyed hither and thither every day.

The London underground railway differs from all other Engligh railways, in this—that when it is finished, it will have neither beginning nor end. "Other lines," says a London journal, "are alternations of cuttings and runs in the open, more or less elevated above the natural level of the surface, occasionally varied by a tunnel; this is a continuous burrow, a succession of covered ways, with troughs of various lengths at irregular intervals, open to the sky for light, but more especially for ventilation." On other railways, you measure space by miles—here you count it by chains and furlongs. Other lines run a dozen, perhaps twenty trains daily; the number of trains passing over the underground every day is twelve hundred; the interval in running is otherwise counted by hours, and here by minutes. The most thriving of other lines do not count up more than one hundred pounds sterling a mile in their receipts; the underground yields over one thousand pounds sterling a mile. In seven years, 150,000,000 people—the population of the United Kingdom six times over—have passed over this line; and on Whitsunday, 1869, (the day when the greatest number went over it), the number of passengers travelling to and from the different stations, was 189,499; the number for that week being 907,657. These facts at once prove the inestimable value and importance to Londoners of this underground railway, and show what a blessing it is to the vast population, which must get quickly to its work, and to which the breath of country air, now within the reach of the poorest, is life and health.

The first portion of the Metropolitan underground railway, extending from Bishop's road to Farrington street, was opened for public traffic on the 10th of January, 1863. It was then in the nature of an experiment. So prompt and grand was its success, that the work was continued, until now its ramifications extend, in a thickly-webbed net-work, from almost every central and suburban point where people live, to every central and frequented point where people work.

Extensions were rapidly made westward, toward Hammersmith, and eastward into the "City," having terminus at Moorgate and Broad streets; while a branch line, joining the first at Baker street, extended northward to the secluded quarter of St. John's Wood.

While one circle will carry you from Moorgate street, via Euston road, Tottenham Court road, and Edgeware road, to Notting Hill and Kensington, an outer circle conveys you by King's Cross to the northern chain of suburbs, notably to Kentish and Camden Town. As the enterprise has become more and more extended, new improvements have been added, the tendency in England, as well as in America, being to increase the conveniences and luxuries of the traveller. More recently, open have been preferred to covered ways, or tunnels, and every opportunity has been taken to increase the one and lessen the other; so that the later ramifications are only to a certain extent "underground." When the property which had to be purchased has been moderate in price, the line of the road has simply been made a valley instead of a burrow. But when, as occurred in one instance, the company has to purchase rows of costly mansions half built, this plan is too expensive. In many cases, the tunnels have been run underneath large buildings, which have been "underpinned," the business in which was not for a moment interrupted. For three miles of railway, more than 50,000 cubic yards of earth was removed, and of the clay which partly composed it, 22,000,000 bricks were made! The new stations are admirable structures in their adaptation to their purpose. The double station at Kensington High street is the largest and best of them, and may be briefly described.

The centre consists of a spacious and lofty apartment, forty-four by thirty-one feet, which is used as a refreshment-room. The two ticket-offices—for this station is double, as being a junction between two lines belonging to different companies—are across the ends of the building. These, as well as the station walls and roofs, are very light, graceful, and effective structures. They are faced with white perforated bricks; the doors and windows have semi-circular heads, and each window-sash is filled with a single sheet of plate-glass. The entrances to the ticket-offices are, of course, on a level with the street; and the station is surmounted with an ornate cupola. Galleries cross the rails overhead for exit, entrance, or change of platform. Stairways descend underground from the offices to the platforms on either side, this subterranean apartment being lighted partly by skylights above, and partly by globular lamps suspended over the platforms on either side. The stations are abundantly supplied with closets, neatly fitted up for the convenience of passengers. The platforms are plank floors, and are sufficiently long to secure six English cars, forty-two feet long each, with engine and tender. Opposite the platforms, on the walls, are large signs with the name of the station; beside numerous advertisements of every imaginable commodity, in letters of every shape, size, and color. The arrangements are so perfect, that there is room enough for all; and although the train stops seemingly only an instant in each station, it does not start until every passenger is, as the case may be, in or out.

It is wonderful to consider this great underground railway on the side of the subject as it affects the people of London. In the first year of its establishment, 9,455,000 people passed over it, the receipts being £101,707; in 1864, the second year, there were $11,722,000 passengers, with the receipts increased to £116,500; in 1865, 15,763,000 passengers made use of it, and the receipts were £141,500; in 1866, passengers, 21,273,000—receipts, £210,000; in 1867, passengers, 23,405,000—receipts, £283,000; in 1868, passengers, 27,708,000—receipts, £284,250; up to June 30, 1869, passengers, 20,000,000—recepts, £190,000.

As in all other English railways, the cars of the underground are divided into first, second, and third class, with accommodations and comforts corresponding, and fares graduated accordingly. It is not, therefore, surprising to learn that the number of third-class passengers has always been in excess of those of the two other classes combined. The best patrons of the underground are the artisans, the people who live by the toil of their hands and the sweat of their brow; and it is to this great class that the underground has itself been a boon of a value to them incalculable. The percentage of first, second, and third class passengers passing over the road is relatively as follows: First class, 10.94; second class, 20.29; third class, 68.77. These figures of themselves show that the underground is essentially and emphatically a *people's* line. They are carried to and from their business in well-built, airy cars, which, if not cushioned and carpeted like the first class cars, have at least clean wooden seats, wide windows, and plenty of room. The average third class fare for any distance is two-pence (four cents) each, being two-thirds less than the omnibus fares, the speed of transit being thrice as rapid. They may travel by trains running at intervals of five or ten minutes from five in the morning till half-past twelve at night. Their fare is almost saved in shoe-leather alone; for the laborer who now, for his two-pence, goes from his suburban cottage to his factory in the heart of the city, six miles, by steam, was wont formerly to trudge it wearily. More than shoe-leather—the wear and tear of the constitution is prevented, in the frequent foul weather of London; and the daily two-pence is a business investment, as preserving health and strength, that a little reflection will show to be simply practical and sound. It may be interesting to our readers to know how this great line is managed, and what measures have to be taken to insure the public safety and comfort. Probably there is no man in London with heavier responsibilities resting upon his shoulders than the manager of the underground railway. An outsider thinks that the working of the line is easy enough—it is only setting trains in motion, and keeping them running to time. The general manager is commander-in-chief of the line, and pays for the power and dignity by bearing the responsibility for everything which goes wrong, and by receiving but scant acknowledgment for the great deal that *does* go right, and for the inevitable anxiety and eternal vigilance which are indispensable in the performance of his office. It has, therefore, been found very difficult to select a manager who could and would assume its duties.

If, at half-past four, A. M., we are "early birds" enough to be up, and find ourselves at the big shed of the Edgeware road station, we shall not have to wait long before seeing the engines "turned out," which initiatory operation takes place at twenty minutes before five. The night before, they have been thoroughly examined, oiled, cleaned and prepared for the ensuing day's work. They start off in rapid succession to the different termini of the line, where the empty trains are sheltered during the night. At a sharp ten minutes after five the trains begin running according to the time-tables, which are given free to the public, and which, in large type, are posted in all the stations. The engines arrive at the several stations in succession, leaving again with the trains attached ten minutes after; for example, an engine arriving at 5 A. M. leaves, with a workman's train at 5:10, and so on. At first there is plenty of room in the trains, the travellers in the very early morning being scant groups of sleepy folks huddled napping in this corner and that. As the morning advances the traffic increases, and now the trains are run in quick succession, the average interval between them, throughout the day, being *three minutes!* At 7:27 P. M. the "withdrawal" of the locomotives begins, and continues till 1:27 A. M., when the last locomotive puffs into the Edgeware road shed, which is the resting-place of all the engines for the night. The last train is the Hammersmith train, which steams into Moorgate street at 12:40, the average number of passengers for the twenty hours having been upwards of a hundred thousand on the Metropolitan alone. Beside this traffic of the Metropolitan proper, the Great Western, Midland, Great Northern, and London, Chatham and Dover companies send more than four hundred trains over the same rails every day. Of late, the Metropolitan, or principal underground company, has become a sort of key by which the traffic of nearly all the railways branching *out* of London is interchanged. You may procure tickets from its station to almost every point in the three kingdoms, and make connections accordingly from almost every part of the metropolis to your destination in the country. Extensions of the two lines, known generally as the Underground Railway, are constantly in progress. At one end the railway will be extended from Moorgate street, in the "City," to Liverpool street, in the far east-end of London, thus forming a connection with the whole Great Eastern system of railways, as yet isolated from this advantage. Then a section is just completed from Westminster to Cannon street, along the Thames, and by the Thames. These two extensions have long been sorely needed by Londoners, and for a good reason. One of the greatest blessings of the Underground Railway to the cockney world has been to thin out, in some degree, those choked-up, jammed-together-oppressively, dangerously-crowded thoroughfares which border near its termini. Hitherto, however, the great central artery, that which is most crowded and suffocated of all, has been unrelieved. Piccadilly, the Strand, Fleet street, and Cheapside, have still, for the enormous traffic which perpetually rolls through them, only the poor locomotive media of cabs and omnibuses; and these impede rather than aid the unceasing tide of traffic. Yet another thoroughfare—the muddy Thames—will be relieved by the new line from Westminster, in the west, to Cannon street, in the east; for, of the thousand who now crowd the little penny steamboats, swarming businessward from Chelsea, Brompton, Pimlico, and that neighborhood, many will resort to the more rapid transit of the railway. Already, it is estimated. this "inner circle" of the Underground has thinned out a hundred thousand from the vast throng which used to choke the central thoroughfare of the metropolis. Statistics prove, too, that travelling by the Underground is less perilous to human life than riding or even walking in the streets. During last year nearly three hundred persons were knocked down and killed, by vans and other vehicles, in the London streets, beside the many hundreds who were injured, but more or less nearly escaped death. But of the one hundred and fifty millions who travelled by the Underground, but a very few lives were lost, and not a solitary one by any neglect or fault of the company's management. The section of the line which has just been opened between Westminster Bridge and Cannon street is about two miles long, and two thousand men were employed on it constantly day and night. The stations between the termini are at Hungerford Bridge, Norfolk street, Strand, and Bridge street, at King William street, Mark Lane, Trinity Square, Aldgate, and, finally, Liverpool street, the extreme eastern terminus.

The entire length, or rather circle, of the Underground Railway, and all the branches are fitted with the "block system," and the machine by which the trains are worked is so ingeniously designed, that it is almost beyond the range of possibility that a train should be run into a wrong section, or there should be a collision. Nothing short of extreme negligence, or criminal design, could effect either of these calamities; for the instrument acts absolutely as a *check* upon any negligence on the part of the signal-man. The management exercises the greatest care in the selection of subordinates, and the rules by which the latter are controlled are despotically strict. No one is taken into the service without a "character," that is, a certificate of good behavior and habits from the previous employer; and, having entered the service, the employé is placed under very strict discipline—immediate dismissal being the peremptory penalty for carelessness. On the other hand, the employés are encouraged to do well by a system of reward; for a yearly bonus is given to those who faithfully and zealously perform their tasks.

With its omnibuses, its little Thames steamboats, and its Underground Railway, now, as has been seen, ramifying in every part of the metropolis where traffic is to be relieved and the streets made passable, it would seem that London is well supplied with conveniences of locomotion. But this age, whether in England or this country, is never content with its new facilities. Already, before the Underground can be said to be completed, an agitation which promises success is on foot to establish horse railways. Such a project has been put into operation in Liverpool, and has received Parliamentary attention; and tracks are now being laid in the Whitechapel district, in the far eastern part of London, so that the experiment will be at least tried, though there is no predicting what "innovations" John Bull will assent to, until his assent is fully given. The latter tendency in England is to give the gov-

ernment as large a control as possible over conveniences and institutions which are for the general benefit; and it may be that, in the course of time, there will not only be a government horse railway, but that the Underground will itself be bought in and governed by the ministers of the crown.

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105,879.—GANG-PLOW.—John Alloways, Decatur, Ill., assignor to himself and W. Cummings, same place.
105,880.—ANIMAL-TRAP.—Samuel Arnold, Silver Springs, Tenn.
105,881.—PEAT MACHINE.—Aimé Nicholas Napoleon Aubin, Portland, Conn.
105,882.—TUBE-WELL.—Samuel S. Ayres, Plainfield, N. J., assignor to himself and Abram Sebring, same place.
105,883.—EXCAVATING-MACHINE.—John A. Bailey, Detroit, Mich., assignor to himself, L. E. Webb, Joseph Lederle, Anthony Lederle, and John H. Wells.
105,884.—PREPARATION OF PAPER STOCK.—Haydn M. Baker, Washington, D. C., assignor to John M. Smith, Brooklyn, N. Y.
105,885.—BEDSTEAD AND COT.—Virginia L. Baker, Richmond, Virginia.
105,886.—STEAM HEATER.—William C. Baker, New York, N. Y.
105,887.—MOLDS FOR CASTING MACKEREL-JIGS.—Greenleaf Bassett, Taunton, Mass.
105,888.—SLIDING DOOR FOR RAILWAY BOX CARS.—John Bassler, Galesburg, Ill.
105,889.—MANUFACTURE OF ARTIFICIAL STONE.—Wm. Augustus Battersby, Brooklyn, N. Y.
105,890, antedated July 19, 1870.—BALL VALVE FOR INJECTING AIR.—Joseph B. Bennett, Brooklyn, N. Y., assignor to himself and Erastus S. Bennett, New York City.
105,891.—WOOL-DRIER.—Lucius S. Blake, Racine, Wis.
105,892.—CORN AND COTTON CULTIVATING-PLOW.—William R. Blanchard, Hertford, N. C.
105,893.—STIRRUP.—Albert H. Blossom, Miamisburg, Ohio.
105,894.—PAPER-CUTTING MACHINE.—John Bole, Grand Rapids, Mich.
105,895.—HEAD-MEASURE FOR HATTERS.—Horace Bonham, Philadelphia, Pa.
105,896.—HOLLOW AUGER.—Charles S. Bonney, Syracuse, N. Y.
105,897.—DEVICE FOR RIVETING.—Samuel L. Bower, Auburn, New York.
105,898.—FOLDING CHAIR.—Asahel C. Boyd, Worcester, Mass., assignor to E. W. Vaill, same place.
105,899.—WHIFFLETREE TRACE-HOOK.—Charles Collins Bradley, Brodhead, Wis., and Benjamin F. Upson, Rockford, Ill.
105,900.—ATTACHING CAPS TO BASES OF BELL-LEVERS.—Edward W. Brattell, Elizabeth, N. J.
105,901.—EGG-HOLDER.—Adna Brown, Springfield, Vt.
105,902.—GRADING AND DITCHING-PLOW.—Samuel N. Caldwell, Pilot Grove, assignor to himself and Wm. Burton, Newton county, Ind.
105,903.—FOLDING CHAIR.—Walter E. Cameron, Taunton, Mass.
105,904, antedated July 27, 1870.—COUPLING FOR WHEEL-FELLIES.—Chandler Cheney, Milford, Mass., assignor for one-half to Wm. Nash, same place.
105,905.—COMBINED SWIFT AND REEL.—Charles H. Clark, Pittsfield, Me.
105,906.—BIT-STOCK.—Charles H. Clark, Pittsfield, Me.
105,907.—BRANCH ATTACHMENT FOR WATER-TUBES.—Josiah S. Clark, Philadelphia, Pa.
105,908.—JOINT FOR TONGS, &c.—William E. Clarke, Troy, N. Y., assigner to Mary E. Dean, same place.
105,909.—STOP ACTION FOR CABINET ORGANS, &c.—Henry A. Clifford, Rockville, Conn.
105,910.—SAWING-MACHINE.—William M. Cochran, Indianapolis, Ind.
105,911.—EXTENSION GAS-FIXTURE.—Henry Coester, New York, N. Y.
105,912.—MACHINE FOR SECURING-SHEET-METAL LINING IN PUMP-STOCKS.—Nathan T. Coffin, Knightstown, Ind.
105,913.—PUMP-VALVE.—Nathan T. Coffin, Knightstown, Ind.
105,914.—CHIGNON.—Moses M. Cohen, Boston, Mass.
105,915.—WIND-WHEEL.—Jesse C. Coleman and Geo. Strayer, Clinton, Kansas.
105,916.—COUGH-SYRUP.—John Conzleman, St. Louis, Mo.
105,917.—HORSE-COLLAR CAP.—Dexter Curtis, Chicago, Ill.
105,918.—SHUTTER-WORKER.—Geo. L. Danforth, Lebanon, N.Y.
105,919.—TOOL-HANDLE.—John B. Davids, New York, N. Y.
105,920.—SEED-HARVESTER.—Fredericke Decker, Delaware, Ohio.
105,921.—ADJUSTABLE LINK.—Andrew J. Dexter, North Foster, Rhode Island.
105,922.—FRAME FOR POTATO-DIGGERS AND SHOVEL-PLOWS.—James Millen Dick, Buffalo, N. Y., assignor to himself and William H. Albro, same place.
105,923.—PROCESS OF SEPARATING FIBERS FROM COTTON-SEED.—Jules Duval, New Orleans, La., assignor to himself, Richard T. Sprague, Boston, Mass., and Charles D. Sprague, New York city.
105,924.—MACHINERY FOR THE MANUFACTURE OF ICE.—William T. Duval, Georgetown, Mass.
105,925.—STOP-PLATE FOR HYDRANTS.—James C. Eastman, Nashua, N. H.
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105,930.—TRAVERSING MACHINE.—Valentine Foland, Indianapolis, Ind.
105,931.—BOAT DETACHING APPARATUS.—James Foster, Jr., Camden, N. J.
105,932.—MODE OF OPERATING SEWING AND OTHER MACHINES.—S. Conant Foster, New York, N. Y.
105,933.—SODA-FOUNTAIN.—Elisha M. Fowler, Washington, D. C., assignor to himself and Andrew McCallom.
105,934.—MODE OF AND DEVICE FOR MAKING GASKETS FOR STEAM PACKING.—Mitchell G. Gardner, Rochester, N. Y.
105,935.—COTTON-SEED PLANTER.—Thomas C. Garlington, Chambers Court-House, Ala.
105,936.—REED MUSICAL INSTRUMENT.—William H. Gerrish, Boston, Mass.
105,937.—DEVICE FOR TRANSMITTING ROTARY MOTION.—Henry J. Hancock, New York, N. Y.
105,938, antedated July 28, 1870.—HAT AND CAP-HOLDER AND BRACKET.—John R. Hartmann and Martin Kais, Peoria, Ill.
105,939.—WHEELBARROW-WHEEL.—Geo. Harris, Weedsport, N. Y.
105,940.—LAMP-SHADE.—Andrew W. Haskell, Boston, Mass.
105,941.—DIRECT-ACTING COMPOUND ENGINE.—William M. Henderson, Philadelphia, Pa.
105,942, antedated July 19, 1870.—GRATE-BAR.—Mark Hodgson, East Saginaw, Mich.
105,943.—PADDLE-WHEEL.—William H. Holland, Boston, Mass.
105,944.—TRACE-BUCKLE.—Alfred Henry Hopson, Taylorville, Illinois.
105,945.—GRAIN-THRASHING AND CLOVER-HULLING MACHINE.—Monroe Hubbel, Reynoldsville, N. Y.
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105,951.—MECHANICAL MOTION.—Andrew Kloman, Pittsburgh, Pennsylvania.
105,952.—IRON ROLLING MILL.—Anthony D. Kloman, Pittsburgh Pa.
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105,959.—REFRIGERATOR.—William B. Mason, Boston, Mass.
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105,961.—SEWING-MACHINE.—John N. McLean, Philadel., Pa.
105,962.—RAILWAY RAIL.—Fenton A. Meredith, Mount Airy, Maryland.
105,963.—FLY-TRAP.—Modest Merk, Rochester, N. Y.
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105,965.—CAR-SEAT LOCK.—Ezra Miller, New York, N. Y.
105,966.—COFFEE-MILL.—John C. Mulligan, Brooklyn, N. Y.
105,967, antedated July 22, 1870.—HAY-RAKE.—William H. Misner and George E. Marker, Heyworth, Ill.
105,968.—MANUFACTURE OF PURE CARBONATE OF POTASH.—Conrad Moll, Kenton, Ohio
105,969.—WASHING-MACHINE.—Jeremiah A. Morelock, Silver Run, Md.
105,970.—CAR-COUPLING.—Anthony T. Morgan, Pottsville, Pa.
105,971.—APPARATUS FOR AUTOMATICALLY REGULATING THE FLOW OF GAS USED IN HEATING VULCANIZERS, &c.—James M. Osgood, Somerville, Mass, assignor to himself and Flagg & Osgood, same place.
105,972.—MUSICAL BOX.—Amédeé Paillard, St. Croix, Switzerland, assignor to M. I. Paillard & Co., New York City.
105,973.—HARVESTER.—Isaac H. Palmer, Lodi, Wis.
105,974.—GRAIN-BINDER.—William H. Payne, Janesville, Wis.
105,975.—CUT-OFF FOR RELAYS AND OTHER ELECTRO-MAGNETIC INSTRUMENTS.—Frederic M. Perry, Barton, Vt.
105,976.—SASH-HOLDER.—W. E. Phelps, Elm Wood, Ill.
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105,984.—ADJUSTABLE RAILWAY TRACK.—Addison V. Sanford, Union Centre, N. Y.
105,985, antedated July 21, 1870.—TOP-PROP FOR CARRIAGES.—Anson Searls, Newark, N. J.
105,986, antedated July 19, 1870.—VALVE FOR STEAM-ENGINES.—William C. Seiden, Brooklyn, N. Y., assignor to himself and Adam Carr, Paterson, N. J.
105,987.—PAPER-FILE.—Francis G. Senseman, Philadelphia, Pa., assignor to himself and A. E. Steel, same place.
105,988.—FENCE-POST.—Charles J. Shuttleworth, Springville, New York.
105,989.—SIFTING-MACHINE.—George Sidey, Brooklyn, N. Y.
105,990.—INTERFERING-PAD FOR HORSES.—John Smith, Boston, Mass.
105,991.—CAKE-PAN.—John Harry Smith, Brooklyn, N. Y.
105,992.—CAKE-PAN.—John Harry Smith, Brooklyn, N. Y.
105,993.—METALLIC CHAIR-SEAT.—Silas Allen Snyder, Clarendon, N. Y.
105,994.—APPARATUS FOR CARBURETTING AIR.—James F. Spence, Brooklyn, N. Y.
105,995.—DITCHING-MACHINE.—Andrew J. Stephens, Milford, Ill.
105,996.—APPARATUS FOR CUTTING GRASS UNDER WATER.—Peter Jerome Stone, Athens, Pa.
105,997.—PLANING-MACHINE.—William Teal, Rochester, N. Y.
105,998.—MACHINE FOR CUSHIONING AND VENTILATING LEATHER. Edwin Thomas, Philadelphia, Pa.
105,999.—SMUT-MILL.—William Carroll Thompson, Williamson county, Tenn.
106,000.—FAUCET.—Henry B. Tiffany, Medina, Ohio.
106,001.—RAILWAY CAR-WHEEL.—Frederick H. Trevithick, Jr., New York, N. Y.
106,002.—AUTOMATIC FIRE-EXTINGUISHER FOR RAILROAD CARS, &c.—William P. Van Duersen and William C. Davis, Cincinnati, Ohio.
106,003.—SULKY-PLOW.—James L. Van Gorder, Sidney, Ohio.
106,004.—COMBINED HARROW, CULTIVATOR, WHEELBARROW AND SLED.—Jacob R. Wagner, Manada Hill, Pa.
106,005.—CARRIAGE-SPRING.—Robert E. Walker, Dresden, Mo.
106,006.—SAW-TABLE FOR SAWING IRREGULAR FORMS.—Gardner A. Watkins, Cavendish, Vt., assignor to himself and Calvin S. Greenwood, Gardner, Mass.
106,007.—FAUCET OR TAP.—Abel L. Webster, New York, N. Y.
106,008.—DEVICE FOR DRAWING LIQUIDS BY COMPRESSED AIR.—Abel L. Webster, New York, N. Y.
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106,010.—MEANS OF ATTACHING THE SOLE TO BOOTS AND SHOES.—William Wickersham, Boston, Mass.
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106,012.—MANUFACTURE OF BOOTS AND SHOES.—William Wickersham, Boston, Mass,
106,013.—BOOT AND SHOE.—William Wickersham, Boston, Mass,
106,014.—STAVE-JOINTING MACHINE.—William Widdowson, Rochester, N. Y.
106,015.—SPIKE-DRAWER.—Benjamin B. Wood, Negaunee, Mich.
106,016.—LAP-BOARD FOR DRESS-MAKERS.—Royal L. Woodbury, Lexington, Mass.
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106,025.—KNITTING-MACHINE.—Varnum G. Arnold, Providence, R. I.
106,026.—MACHINE FOR MANUFACTURING NEEDLE.—Joseph B. Blanchard, Boston, Mass.
106,027.—COOKING-RANGE.—Daniel Bosworth, New York, N. Y. assignor to Jordan L. Mott, same place.
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106,030.—BOOT AND SHOE.—Andrew Burke, New York, N. Y.
106,031.—CABLE-STOPPER.—Ethan R. Cheney, Boston, Mass., and John J. Emory, Owl's Head, Me.
106,032.—SEWING-MACHINE.—John V. Coon, Eloria, Ohio.
106,033.—HANDLE FOR CHILDREN'S CARRIAGES AND PERAMBULATORS—William E. Crandall, New York, N. Y.
106,034.—CORN-PLANTER.—Jonathan W. Crume, Troy, Mo.
106,035.—FENCE-POST.—Samuel A. Darrach, Newburg, N. Y.
106,036.—CORK-SCREW.—Walter Dickson, Albany, N. Y.
106,037.—TRACE-HOLDER FOR HARNESS.—Richard M. Dill, Morgantown, Ind.
106,038.—LOOM-TEMPLE.—Warren Whitney Dutcher, Hopedale, Mass.
106,039.—WHEEL CULTIVATOR.—Jefferson Eshleman, Canaan Centre, Ohio, assignor to himself and Levi E. Miller, same place.
106,040.—PORTABLE COOKING-STOVE.—Edward Evans, Philadelphia, Pa.
106,041.—PIPE-COUPLING.—Louis Alexandre Farjon, Brussels, Belgium.
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106,044.—BRIDLE-BIT.—Masculine Foreacre, New Harrisburg, Ohio.
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106,065.—MODE OF ATTACHING LOOKING-GLASS FRAME TO BUREAUS.—Cheney Kilburn, Philadelphia, Pa., assignor to Killburn & Gates, same place.
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106,082.—UMBRELLA.—Nathaniel Sehner, Hagerstown, Md., assignor to himself, John F. Keller, and Abraham Huffner, same place.
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106,088.—PORTABLE-FENCE.—John O. Smith, Reily, Ohio.
106,089.—WATER-CLOSET RECEIVER.—William Smith, San Francisco, Cal.
106,090.—SUSPENDED SHELF.—Joseph B. Stockton, Edmundton, Kentucky.
106,091.—APPARATUS FOR THE TREATMENT OF FRACTURE OF THE LOWER JAW—John Stowe, Lawrence, Mass.
106,092.—NEEDLE FOR SEWING-MACHINE.—Edwin Strain, Newton, Mass.
106,093.—COCK.—Theodore H. Thayer, New Haven, Conn.
106,094.—SPITTOON.—William H. Topham, New York, N. Y.
106,095.—STOCK-BARN.—John Tyler, New Carlisle, Ohio.
106,896.—LUBRICATING JOURNALS FOR RAILWAY AXLE-BOXES.—Ernest Von Jeinsen, Omaha, Nebraska.
106,097.—PANELING-MACHINE.—Dwight F. Walker, Minneapolis, Minn.
106,098.—DEVICE FOR MOISTENING AND CLOSING ENVELOPES.—Redford W. Walker, Washington, D. C.
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106,101.—MACHINE FOR CUTTING TELTILE AND OTHER MATERIAL. Albin Warth, Stapleton, N. Y.
106,102.—CLOTHES-RACK.—Chas. H. Wolcott, Jamestown, N. Y.
106,103.—METER.—George Sewell, Brooklyn, N. Y.

REISSUES.

4,084.—PRINTING-PRESS.—R. Hoe & Company, New York, N. Y., assignees of Stephen D. Tucker.—Patent No. 43,350, dated June 28, 1864.

4,085.—Division A.—WATER-SUPPLY REGULATOR FOR WATER-WORKS.—Birdsill Holly, Lockport, N. Y.—Patent No. 87,413, dated March 2, 1869.

4,086.—Division B.—WATER-SUPPLY REGULATOR FOR WATER-WORKS.—Birdsill Holly, Lockport, N. Y.—Patent No. 87,413, dated March 2, 1869.

4,087.—Division C.—WATER-SUPPLY REGULATOR FOR WATER WORKS.—Birdsill Holly, Lockport, N. Y.—Patent No. 87,413, dated March 2, 1869.

4,088.—MODE OF FASTENING SKATES.—Nathaniel Ladd, Brooklyn, N. Y., assignee, by mesne assignments, of the administrators of the Estate of Edward Behr, deceased.—Patent No. 23,344, dated March 29, 1859.

4,089.—HARVESTER-RAKE.—Amos Rank, Salem, Ohio.—Patent No. 96,353, dated November 2, 1869.

4,090.—PAPER-CUTTING MACHINE.—George H. Sanborn, New York, N. Y., assignee of Thomas C. Robinson.—Patent No. 97,120, dated November 23, 1869.

4,091.—GRAIN-DRILL.—John H. Thomas, Phineas P. Mast, and Charles O Gardiner, Springfield, Ohio, assignors to John H. Thomas, and Phineas P. Mast, same place.—Patent No. 93,369, dated August 3, 1869.

DESIGNS.

4,267.—TYPE.—Richard Smith, Philadelphia, Pa., assignor to Mackellar, Smith's & Jordan.

4,268.—BRACKET.—John H. Bellamy, Charlestown, Mass.

4,269.—ARM-CHAIR.—Walter E. Cameron, Taunton, Mass.

4,270.—KNITTED FABRIC.—Martin Landenberger, Philadel., Pa.

4,271.—KNITTED FABRIC.—Martin Landenberger, Philadel., Pa.

4,272.—SHAWL FABRIC.—Martin Landenberger, Philadel., Pa.

4,273.—FLOWER-POT.—James Leak, Geddes, N. Y., assignor to himself, Thomas G White, and William Holmes.

4,274.—REFRIGERATOR AND WATER-COOLER.—Charles C. Savery. Philadelphia, Pa.

EXTENSIONS.

OLIVER F. GROVER, of Middletown, Conn.—Letters Patent No. 15,358, dated July 15, 1856.—Printers Composing Stick.

HORACE WOODMAN, of Saco, Me.—Letters Patent No. 15,313, dated July 8, 1856; reissue No. 2,202, dated March 13, 1866.—Improvement in Machinery for Cleaning Top-Flats of Carding-Engines.

Mining Patents.

The Commissioner of the General Land Office has transmitted the papents for the following named claims on the Comstock Lode in Nevada, viz: Utah Silver Mining Company's claim for 1,000 feet; JOSEPH FRENCH'S claim of 20 feet; Bacon Mill and Mining Company's claim for 45 feet; Bacon Mill and Mining Company's claim for 20 feet; New York and Nevada Gold and Silver Mill and Mining Company's claim for 40 feet; New York and Washoe Company's claim for 50 feet; Best and Belcher Company's claim for 215 feet.

Competitive Examinations.

The plan of subjecting applicants for clerical positions under the Government to examination, which was inaugurated by Commissioner FISHER, of the Patent Office, and recently applied in the selection of the clerks in the Census Office, has been found to work so successfully that Secretary Cox has ordered its application to all the bureaus of the Interior Department. Hereafter, when there are appointments to be made, the head of the bureau, with two other competent persons, will constitute a board for the examination of the candidates, and the examination will be conducted in writing and under fictitious names so that the successful ones will not be known even to the board until after the award has been made.

While of course Congressional or other recommendations as to character, etc., will be required to place names upon the list of candidates, this plan will prevent men from being foisted upon the departments who are utterly worthless and whose only recommendations are the same as that which got the notorious TOM BOWIE released from jail, that they were active in bringing up voters."

The presence of a half dozen of these dead-beats in a department has a demoralizing effect upon the whole force, and we are glad to see that Secretary Cox has led off in a reform which the other departments will be compelled to follow or be content to be recognized as employing an inferior clerical force. Every good clerk will welcome this reform, and politicians cannot have the hardihood to ask the appointment of an incompetent person on the ground that he has been of personal service to themselves.—*Washington Republican.*

Manufacture of Iron and Steel.

THE object of some improvements under the above head, which are by Mr. WILLIAM GORMAN, of Glasgow, who is an engineer, is principally to improve the manufacture of iron and steel by adopting processes and apparatus whereby the expenditure of fuel may be reduced and the quality of the iron or steel ameliorated, and by utilising some of the bye-products hitherto wasted. Parts of the improvements are, however, also applicable otherwise, as hereafter explained. One part of the invention consists in effecting the calcination and reduction, or partial reduction, of the ores in retorts or vessels heated externally, and from the interiors of which air is excluded to prevent the access of oxygen to the ores, whilst the volatile matters proceeding from them are collected for use. Ores comprising free carbon in sufficient quantity for their reduction may be treated by themselves, but ores without sufficient carbon must have carbonaceous matter added to them. Ores or minerals poor in iron but rich in carbon are the most suitable materials for adding in in this way, as the carbonaceous matters contained in them yield oil, whilst their iron is very free from impurities, so that ores or minerals of no value for yielding iron or oil separately are thus profitably available. When carboniferous ores are not obtainable, cannel or similar coals may be advantageously used in this process. In some cases reducing gases produced from coal, coke, charcoal, or other carbonaceous matter are passed into the retorts amongst the ores, and in some cases these ores are additionally heated before being introduced into the retorts. The retorts may be heated by the otherwise waste heat of an adjoining furnace or by a special furnace. Instead of the retorts the main shaft of a blast furnace or any other suitable chamber may be employed to contain the ores whilst being treated with the heated gases to effect their calcination and reduction, or partial reduction. After the ores leave the retorts or chambers they are subjected to a much greater heat, and are supplied with lime or other suitable flux, and carbon or oxides of iron, and of manganese, as required for producing the quality of metal desired preparatory to fusion. Lime or other flux may also be introduced with the ores into the preliminary calcining or reducing retorts or chambers. For preparing and fusing the reduced ores, there is used a combination or modification of certain furnaces described in the specification of letters-patent granted to the inventor and Mr. JOHN PATON, in December 1863 (No. 3057). The peculiar advantages of the reverberatory and blast furnaces are combined, so that the heat from the solid as well as that from the gaseous part of the coal is made to act in reducing or fusing the ores or metals, which are first heated by the flame on the bed of the furnace and are then transferred or glide down into a hearth where the solid fuel is consumed and where the fusion is completed. The air for combustion is heated by the waste heat, as described in the earlier specifications before referred to; the retorts or reducing gases above described may also be heated by the waste heat of this furnace. The before-described arrangements are adapted to produce crude cast iron from the ore, and also the various fusible compounds of iron or steel. In producing malleable iron or steel by this invention, a furnace such as is before-described is used for fusing the cast iron, and with the cast iron may be fused ores or oxides of iron, or of manganese, to assist in decarburising the pig or in modifying the steel if produced. When the iron is fused, it is run into a vessel and carried to the puddling furnace; or the fusing furnace may be placed at a higher level, and the iron be run from it down a heated channel to the puddling furnace. Jets of air, or air and super-heated steam, may be blown through or amongst the fused iron whilst it is running or being conveyed to, or after it is in the puddling furnace. Pulverised oxide of iron may also be blown into the molten iron by the air or combined steam jets, or the oxide of iron in a granulated form may be added otherwise to assist in decarburising and refining the crude iron. The puddling furnace and vessel referred to may also be lined or fettled with oxide of iron; the bottom of the puddling furnace is in some cases made as a movable vessel or dish, so that it may be removed from the furnace in order that the iron may be taken out of it in a mass if desired to be shingled or rolled. A number of such moveable bottoms are provided with trucks and rails to admit of their being adjusted to different fusing or other furnaces, and rings, hooks, or trunnions are fixed to them for lifting them by cranes, and for turning them up for emptying them. They are also provided with tap-holes for running out cinder. The furnaces to be used for puddling or for heating puddled iron are like what are described in the earlier specifications before referred to, but the flame and fire-gases, instead of passing straight through in the usual manner, are made to revolve within the furnace and return upon the object to be heated, so as to communicate a great amount of heat to them. This is effected by introducing the flame or gases in a tangential direction, and placing the escape outlet at the centre of the circulating currents thus produced. In other cases it will be preferable to make a long furnace with openings in the bottom constructed for movable bottoms, so that different stages of the puddling or refining process may go on at different parts of one furnace, the bottom being shifted from one opening to the other as required. The gas produced for making combustible or reducing gases for the purposes of this invention, or others, may be made according to an earlier specification before referred to, but with the following improvements:—One improvement consists in making it round or oval in horizontal section, or with straight sides connected by curves. A second improvement consists in contracting the bottom of the body by a ledge carried round the lower opening, whilst the ash-pit is enlarged to admit of the grate bars being moved about freely without uncovering the opening. It is preferred to use moving bars, such as those of what is known as Jukes' furnace. The producer may be placed at a low level, and may be supplied with air of a pressure above that of the atmosphere, by means such as are hereafter described or otherwise, so that the gas produced may be of corresponding pressure. As it is desirable that, in furnaces for heating iron and other substances affected by the air, the pressure should not be less than that of the atmosphere, the draught of a chimney may be employed to produce a plenum by placing in the centre of a passage, through which air is made to rush by the action of the chimney draught, another smaller passage or tube with its mouth open to the force of the current, and arranged to lead the air that enters it to the fuel by which the furnace is heated. The air rushing into the smaller passage from the larger current, will produce a greater pressure in the furnace than exists in ordinary arrangements, and thereby prevent the leakage inwards of air at points where its pressure in a free state is injurious. The waste gaseous products of the furnace are led into the same or a different chimney by a flue fitted with a valve to regulate the pressure or draught as desired. For the purpose of obtaining the highest temperature and most complete combustion in furnaces for heating iron, or in any furnaces in which gaseous fuel is used, the gases are mixed with the air necessary for combustion, such air being by preference previously heated, and are then led through a collar or contracted orifice as nearly as possible at the instant of their ignition and combination, by which means they are forced into intimate union, which conduces to their more complete combustion. The air-blasts required for effecting rapid and intense combustion in some of the before-described operations may be obtained by ordinary blowing apparatus, but the inventor prefers to adopt, on account of its simplicity, apparatus of the kind described in the specification of certain letters-patent granted to him in December, 1852 (No. 14,351), but he renders such apparatus more efficient according to the present invention by widening the blades of the steam-wheel towards the centre to permit a freer exit of the steam, also by providing a stop at the centre to prevent the steam from passing the centre, also by closing the bearing of the centre shaft at the end so that the steam cannot blow out the lubricant for that shaft, and by forming or fixing a collar on the shaft to assist further in retaining the lubricant. This improved steam-wheel is extremely convenient for driving a blowing fan, as the fan may be fixed on the same shaft as the wheel, the velocity of the latter being quite sufficient, and intermediate gearing or belts unnecessary. The wheel is also advantageously suitable for driving circular saws or for driving other apparatus requiring high speed. No. of specification, 3,267, (1869.)—*Colliery Guardian.*

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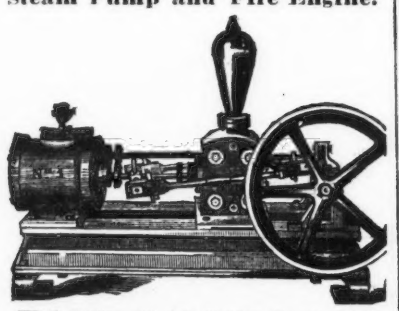

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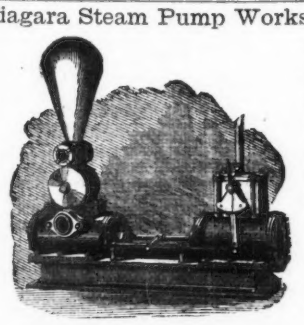

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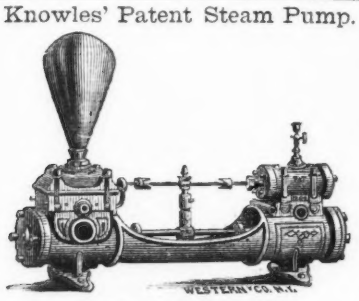

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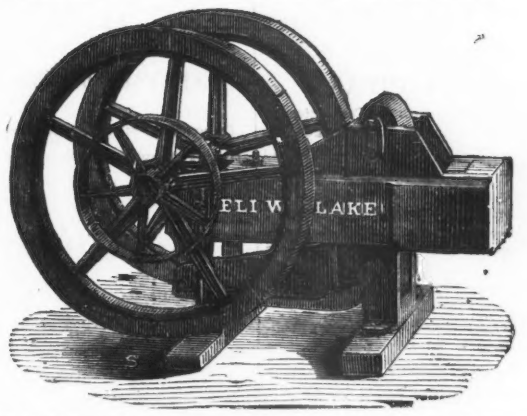

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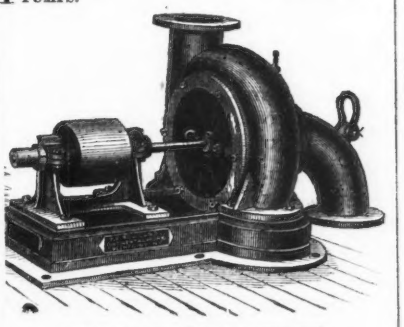

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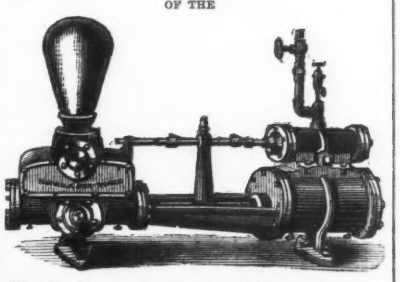

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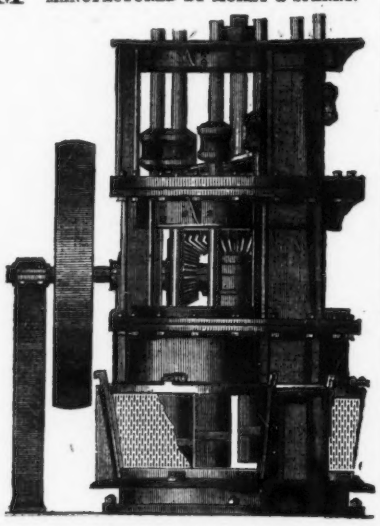

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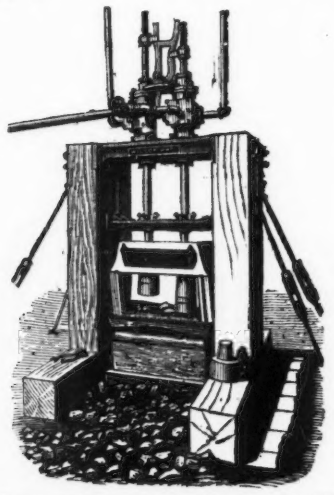

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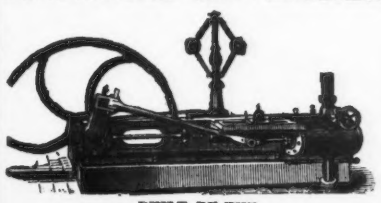

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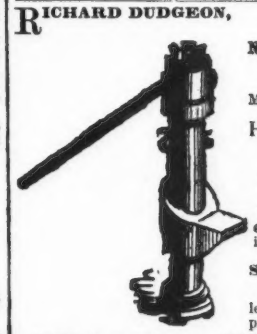

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No. 3. For paving Forty-eighth street, from Fifth to Sixth avenue, with stone blocks.

No. 4. For paving Forty-sixth street, from Ninth avenue to Hudson River, with stone blocks.

No. 5. For paving Sixteenth street, from Avenue C to First avenue, with stone blocks.

No. 6. For paving Fifteenth street, from Eighth to Ninth avenue, with stone blocks.

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No. 13. For sewer in Thirty-sixth street, between Third and Lexington avenues.

No. 14. For sewer in Thirty-seventh street, between Third and Lexington avenues.

No. 15. For sewer in Greenwich street, between Barrow and Morton streets, and Weehawken street, between Christopher and West Tenth streets.

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No. 17. For regulating, grading, curb, gutter, &c., Eighth avenue (Section 2), from Eighty-first to 100th street.

No. 18. For regulating, grading, curb, gutter, &c., Eighth avenue (Section 3), from 100th to 122d street.

No. 19. For regulating, grading, curb, gutter, &c., Eighty-first street, from Ninth avenue to Riverside Park.

No. 20. For regulating, grading, curb, gutter, &c., Fifty-sixth street, from Third to Sixth avenue.

No. 21. For regulating, grading, curb, gutter, &c., Sixty-sixth street, from First avenue to Avenue A.

No. 22. For curb, gutter, and flagging Fifty-ninth street, from Eighth to Ninth avenue.

No. 23. For curb, gutter, and flagging Mangin street, from Stanton to Houston street.

No. 24. For regulating, grading, curb, gutter, &c., Seventy-eighth street, from First avenue to Avenue A.

No. 25. For flagging Avenue A, from Seventeenth to Twenty fourth street.

Blank forms of proposals, together with the specifications and agreements, can be obtained on application at this office.

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Commissioner.
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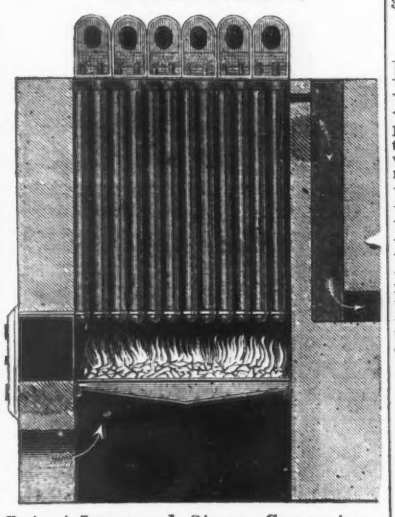

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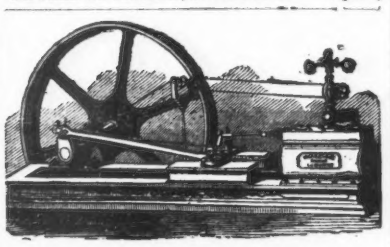

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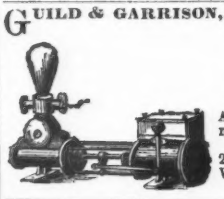

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Said plans will be received until September 15, 1870.

Plans are solicited that shall contain provision for the special accommodation of steamers and vessels engaged in foreign trade, in domestic trade, in the coal trade, in the trade in lumber and building material, in the hay and grain trade, in furnishing market supplies; also for the accommodation of steamboats plying to places on the Hudson River and Long Island Sound, for the canal boats arriving in this city, and for the railroads and other commercial interests.

Plans should be accompanied by all necessary documents, estimates and particulars.

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Commissioners of the Department of Docks.
Jul. 26-e.o.w.

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aug2,4t Commissioner Public Works.

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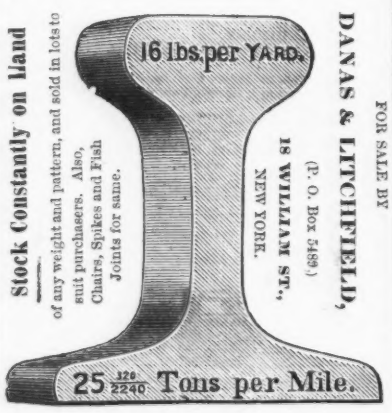

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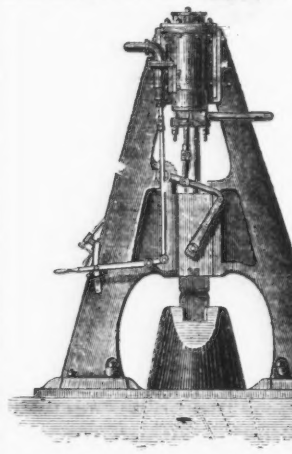

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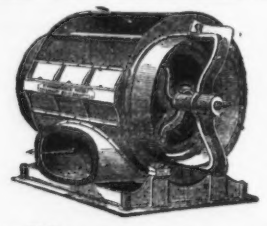

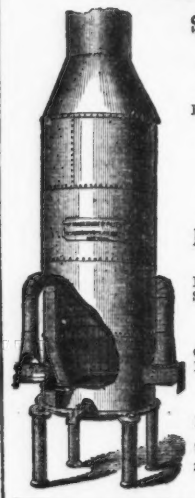

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